

The Hamilton, Montana PM_{2.5} Source Apportionment Research Study

**Final Report
Revision 1**

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by

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1.0 Executive Summary

During the winter of 2007/2008, The University of Montana, Center for Environmental Health Sciences (UM-CEHS) conducted a source apportionment program in Hamilton, Montana for particulate matter less than or equal to 2.5 microns in diameter (PM_{2.5}). The town of Hamilton is located approximately 50 miles south of Missoula in the Bitterroot valley, and frequently experiences temperature inversions throughout the winter months that contribute to elevated levels of PM_{2.5}. The population of Hamilton is ~4,700 (USCB, 2008a), with an estimated 40,582 living within Ravalli County (USCB, 2008b),

The goal of this research program was to identify the major sources of PM_{2.5} in the Hamilton airshed during the winter of 2007/2008. A Chemical Mass Balance (CMB) computer model was used to apportion the sources of the fine fraction, where information on the chemical composition of the ambient PM_{2.5} and anticipated PM_{2.5} emission sources in the city of Hamilton served as model inputs. Throughout the program, PM_{2.5} Federal Reference Method (FRM) air monitors sampled the ambient air every six days from November 2, 2007 through March 1, 2008. After the samples were collected, they were analyzed by contracted laboratories for mass and chemical composition (including elements, ions, organic/elemental carbon, and ¹⁴C).

For the CMB samples collected during the winter of 2007/2008, the average PM_{2.5} 24-hour concentration was 11.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), with the highest concentration (43.1 $\mu\text{g}/\text{m}^3$) measured on 1/25/08. The results of the CMB modeling revealed that wood smoke (likely residential wood combustion) was the major source of PM_{2.5} throughout the winter months in Hamilton, contributing an average of 75.8% of the measured PM_{2.5}. The other sources of PM_{2.5} identified by the CMB model were ammonium nitrate (17.4%), secondary sulfate (4.4%), and street sand (1.0%). With the exception of no automobiles detected by the model during the 2007/2008 study, the identified sources are consistent with those identified during the 2006/2007 Hamilton PM_{2.5} source apportionment project conducted by UM-CEHS. Results from the ¹⁴C analyses show that an average of 75.4% of the measured PM_{2.5} came from a new carbon, or wood smoke source. In summary, the CMB model results coupled with the ¹⁴C results, support that wood smoke is the major contributor to the overall PM_{2.5} mass in the Hamilton airshed during the winter months.

2.0 Overview

Through six Services (as stated in DEQ Contract No. 506062), a research study was designed by UM-CEHS to identify the sources of PM_{2.5} in Hamilton, Montana. This study included sampling, analytical, and computer modeling components per the following contract services:

- Service 1: Establish Methods
- Service 2: Monitoring and Data Collection
- Service 3: Data Analysis
- Service 4: Modeling
- Service 5: Quarterly Reports
- Service 6: Final Project Report

The following Sections 3.0 through 6.0 of this report provide a description of DEQ Contract Services 1 through 4, while Section 7.0 presents the results and a discussion of the sampling, analytical, and modeling programs, respectively.

3.0 Service 1: Establish Methods

At the start of this project, UM-CEHS reviewed the sampling and analytical methods employed by DEQ in Hamilton as part of their existing PM_{2.5} compliance sampling program. In order to conduct PM_{2.5} source apportionment, both the sampling and analytical components were expanded to collect information on the chemical composition of the ambient PM_{2.5}. These modifications to the sampling and analytical programs are discussed in the following sections.

4.0 Service 2: Monitoring and Data Collection

4.1 Sampling Program Experimental Method

Ambient air samples were collected every six days (24-hour) throughout the winter months in Hamilton beginning 11/2/07 and ending 3/1/08 following the Environmental Protection Agency's (EPA) fixed monitoring schedule. Throughout the program, three FRM PM_{2.5} samplers (BGI PQ200) were used to collect the 47-mm filters. One sampler collected ambient PM_{2.5} samples using a Teflon filter as part of Montana DEQ's compliance sampling program. The other two co-located samplers collected PM_{2.5} on quartz filters.

4.2 Sampling Program Quality Assurance / Quality Control (QA/QC)

Teflon filters are utilized as part of DEQ's normal PM_{2.5} sampling program, and were thereby supplied by DEQ. For the quartz filter sampling program, UM-CEHS provided clean PM_{2.5} quartz filters to Ravalli County personnel throughout the four month CMB sampling program. These quartz filters were purchased pre-cleaned from Chester LabNet (Tigard, OR) at the onset of the study.

During shipment of clean quartz sample media from the UM-CEHS laboratory to Hamilton, all filters remained in their protective containers inside an insulated portable cooler equipped with

cold packs. During the 24-hour sampling period, the filters were never subjected to temperatures that exceeded the ambient temperature by more than five degrees Celsius ($^{\circ}\text{C}$) for more than 30 continuous minutes. Filters were recovered from the samplers by Ravalli County personnel within 48 hours after each sampling event ended. Exposed samples were then refrigerated immediately upon collection. All filters were transported in an insulated portable cooler from Hamilton to the UM-CEHS laboratory, and stored in a freezer at UM-CEHS until shipped off for further analysis. PM_{2.5} filters sent to Chester LabNet and the University of Arizona for chemical analyses were shipped overnight via FedEx in an insulated cooler equipped with cold packs.

Throughout the sampling program, the three Hamilton PM_{2.5} FRM samplers were maintained by DEQ. In addition, the samplers were audited by DEQ with an independent transfer standard during the four month program to verify the accurate measurement of air flow rates, ambient/filter temperatures, and barometric pressures.

5.0 Service 3: Data Analysis

5.1 PM_{2.5} Speciation Data

For the Teflon filters collected during the Hamilton (and the other monitoring sites throughout the state of Montana) PM_{2.5} compliance sampling program, the Montana DEQ contracts with Intermountain Labs (IML, Sheridan, WY) for gravimetric analyses. Since IML does not have an X-Ray Fluorescence instrument needed to conduct the elemental analyses required for the CMB source apportionment computer modeling, IML sent archived Hamilton Teflon filters to Chester LabNet (Tigard, OR) for the elemental analyses. Following the elemental analyses, Chester LabNet sent the Hamilton Teflon filters back to IML for archiving. In addition to the elemental analyses on the Teflon filters, quartz filters were also analyzed at Chester LabNet.

To summarize, the following chemical speciation analyses were conducted on the Hamilton Teflon and quartz filters, respectively:

Teflon Filter

- **Gravimetric (IML):** PM_{2.5} mass by a microbalance.
- **Elemental (Chester LabNet):** 38 trace elements by energy-dispersive X-Ray Fluorescence (EDXRF).

Quartz Filter

- **Carbon Species (Chester LabNet):** Elemental Carbon (EC) and Organic Carbon (OC) by Thermal Optical Reflectance (TOR).
- **Cations/Anions (Chester LabNet):** Cations (ammonium, potassium, sodium,) and anions (nitrate, sulfate, chloride, and fluoride) by Ion Chromatography (IC). Calcium and magnesium were analyzed by Inductively Coupled Plasma (ICP).

Hamilton PM_{2.5} mass results, expressed in terms of microgram per cubic meter ($\mu\text{g}/\text{m}^3$) and sampler air flow rates/volumes were provided by DEQ to UM-CEHS for use in the CMB model.

5.2 Carbon 14 (^{14}C) Analysis

The abundance of ^{14}C in an organic molecule provides information on the source of its carbon. If ^{14}C is present at concentrations relatively equal to the ‘normal’ levels found in the atmosphere, then the molecule must have come from a recent plant product. If a molecule contains no detectable ^{14}C , it must have come from a petrochemical or some other ancient source. Thus, analyzing the PM_{2.5} samples for ^{14}C provides additional information on the sources of PM_{2.5} in an airshed. Specifically, it helps to separate the PM_{2.5} emitted by wood combustion (‘new’ carbon - measurable ^{14}C) versus that emitted by fossil fuel combustion, such as diesel exhaust (‘old’ carbon - no ^{14}C). For the Hamilton program, ^{14}C analyses were conducted on 47-mm quartz filter samples at the University of Arizona’s (UA) Accelerator Mass Spectrometry Laboratory Facility.

5.3 Analytical Program QA/QC

Both Chester LabNet and the University of Arizona were responsible for QA/QC activities within their laboratory. A full QA/QC plan can be provided by Chester LabNet and / or the University of Arizona upon request.

Field and trip blanks provide an estimate of total measurement system contamination. By looking at the results of the field/trip blanks, the amount of contamination due to field and filter shipping activities can be estimated. UM-CEHS collected two PM_{2.5} quartz filter field blanks in Hamilton throughout the 2007/2008 program. For the compliance sampling, the use of field blanks (Teflon filters) is a standard requirement of the Montana DEQ QA/QC program.

6.0 Service 4: Modeling

In this project, the most recent version of the Chemical Mass Balance (CMB) computer model (version 8.2) was utilized to apportion the sources of PM_{2.5} in Hamilton. The CMB receptor model (Friedlander, 1973; Cooper and Watson, 1980; Gordon, 1980, 1988; Watson, 1984; Watson et al., 1984; 1990; Hidy and Venkataraman, 1996) consists of a solution to linear equations that expresses each receptor chemical concentration as a linear sum of products of source fingerprint abundances and contributions. The modeling process began by loading the ambient PM_{2.5} speciation data (mass, elements, ions, and OC/EC) with associated uncertainties into the model, along with PM_{2.5} source information (source profile abundances, or the mass fraction of an analyte in the emissions from each source type) from the Hamilton airshed. The 50 parameters listed in Tables 3 through 5 were used as fitting species in the Hamilton CMB model. For each sample day, the CMB modeling process began by selecting combinations of 75 sources and 50 chemical species in an effort to reconstruct the measured PM_{2.5} mass and chemical composition. Multiple combinations would be tried for each sample run, with an evaluation of the diagnostic measures conducted each time until an optimal fit could be obtained. The resulting output file contained the source contribution estimate (SCE) of each identified source to each measured species, along with the associated standard errors (STD ERR) for each identified source.

6.1 CMB Model Source Profiles

After discussions with DEQ personnel, a list of sources that could potentially contribute PM_{2.5} to the Hamilton airshed was developed. For each identified source, an attempt was made to locate a source profile. Source profiles are the fractional mass abundances of measured chemical species relative to primary PM_{2.5} mass in source emissions, and are part of the input data loaded into the CMB model. Source profiles represent a general source category rather than any local, individual, PM_{2.5} emission source.

Table 1 presents the source profiles used in the 2007/2008 Hamilton CMB study. The profiles in this table are listed together as source groups, and can be broken down into profiles for street sand and road dust (Profiles 1- 10 and 75), pure secondary source emissions (Profiles 11-13), gasoline and diesel exhaust emissions (Profiles 14 – 40), tire and brake wear (Profiles 41 - 46), meat cooking (Profiles 47 - 50), deicer (Profile 51), and residential wood combustion (Profiles 52 – 71). Since this source list was also used for the Belgrade, Butte, and Helena PM_{2.5} source apportionment studies, local industrial source types are also listed in Table 1 (Profiles 72 – 74), including grain handling dust, cement kiln, and gypsum calciner sources. Multiple source profiles for each source were used because source compositions can vary substantially among sources, even within a single source over an extended period of time. These variations are caused by:

- 1) transformation and deposition between the emissions point and the receptor;
- 2) differences in fuel type and operating processes between similar sources or the same source in time; and
- 3) uncertainties or differences between the source profile measurement methods (Watson et al., 1998).

Source profiles were either taken directly from the most recent version of SPECIATE 4.0 (USEPA, 2006) or from previous Missoula Valley CMB applications (Carlson, 1990; Schmidt, 1996; Ward and Smith, 2004). SPECIATE 4.0 is EPA's repository of Total Organic Compound (TOC) and Particulate Matter (PM) speciated source profiles for use in source apportionment studies. For each source found in the database, both the compound fraction and uncertainty for the source-specific compounds are presented. Since Missoula and Hamilton have similar topographies and many of the same sources of PM_{2.5}, several of the CMB source profiles developed in past Missoula CMB applications were included in the Hamilton PM_{2.5} source apportionment program. These include profiles for street sand (Profiles 1 - 4), secondary sulfate (Profile 11), secondary ammonium sulfate (Profile 12), secondary ammonium nitrate (Profile 13), diesel train (Profile 39) and diesel truck exhaust (Profile 40), deicer (Profile 51), and residential wood combustion (Profile 54). All SPECIATE and Missoula CMB profiles used in the Hamilton CMB were reviewed before being loaded into the CMB model. For those chemical species known to be absent from specific source types, default values of zero for the mass fraction and uncertainty of 0.0001 were used.

One assumption of the CMB model is that compositions of source emissions are constant over the period of ambient and source sampling, and that chemical species do not react with each other. CMB is well suited for apportioning sources of primary aerosols (those emitted directly as particles). However, it is difficult to attribute secondary aerosols formed through gas-to-particle

transformation in the atmosphere to specific sources. Sulfate, nitrate, and ammonium abundances in directly emitted particles are not sufficient to account for the concentrations of these species measured in the atmosphere. Therefore, to account for secondary aerosol contributions to PM_{2.5} mass, sulfate (Profile 11), ammonium sulfate (Profile 12), and ammonium nitrate (Profile 13) were expressed as “pure” secondary source profiles, and represented by their chemical form.

Table 1: PM_{2.5} Source Profiles Used in the Hamilton CMB.

Profile	ID	Description
1	ST_SANDF	CITY STREET SANDING PILE, STREET SAND
2	ERN_RUSF	INTERSECTION ERNEST AND RUSSEL ST, STREET SAND
3	RUS_STF2	RUSSEL ST, STREET SAND
4	DESP_LTF	DESPERADO PARKING LOT, STREET SAND
5	RDDST_BT	SPECIATE 411042.5, PAVED ROAD DUST - BUTTE, MT
6	RDDST_CP	SPECIATE 411302.5, PAVED ROAD DUST – COMPOSITE
7	RDDST_HE	SPECIATE 411052.5, PAVED ROAD DUST - EAST HELENA, MT
8	RDDST_MS	SPECIATE 411012.5, PAVED ROAD DUST - MISSOULA, MT
9	UNDST_CP	SPECIATE 412202.5, UNPAVED ROAD DUST – COMPOSITE
10	UNDST_HE	SPECIATE 412042.5, UNPAVED ROAD DUST - EAST HELENA, MT
11	SO4_FZER	SULFATE (SO4 IS ONLY SPECIE, THEREFORE IS ONLY NONZERO CONCENTRATION)
12	NH4SO4F2	AMMONIUM SULFATE (INCLUDES NH4)
13	NH4NO3F2	AMMONIUM NITRATE (INCLUDES NH4)
14	LDV_PBCF	SPECIATE 311052.5 LIGHT DUTY VEHICLE-LEADED COMPOSITE
15	LDV_XPBF	SPECIATE 312022.5 LIGHT DUTY VEHICLE-UNLEADED
16	LDV_DSLF	SPECIATE 321022.5 LIGHT DUTY VEHICLE-DIESEL
17	LDV_DS2F	SPECIATE 321032.5 LIGHT DUTY VEHICLE-DIESEL (2 ND PROFILE OF THIS TYPE)
18	HDV_DSLF	SPECIATE 322032.5, HEAVY DUTY VEHICLE-DIESEL
19	LDV_NCAT	SPECIATE 311082.5, LIGHT DUTY VEHICLE - NON CATALYST
20	LDV_WCAT	SPECIATE 311072.5, LIGHT DUTY VEHICLE - WITH CATALYST
21	HDV_TRK1	SPECIATE 322022.5, HEAVY DUTY DIESEL
22	HDV_TRK2	SPECIATE 322082.5, HEAVY DUTY DIESEL TRUCKS
23	LDV_UNL1	SPECIATE 312012.5, LIGHT DUTY VEHICLE – UNLEADED
24	LDV_UNL2	SPECIATE 312032.5, LIGHT DUTY VEHICLE – UNLEADED
25	GASEXST1	SPECIATE 3875, GASOLINE EXHAUST - WINTER, SMOKER
26	GASEXST2	SPECIATE 3884, GASOLINE EXHAUST - WINTER, LOW Emitter PROFILE 1
27	GASEXST3	SPECIATE 3888, GASOLINE EXHAUST - WINTER, LOW Emitter PROFILE 2
28	GASEXST4	SPECIATE 3892, GASOLINE EXHAUST - WINTER, HIGH Emitter PROFILE 1
29	GASEXST5	SPECIATE 3896, GASOLINE EXHAUST - WINTER, HIGH Emitter PROFILE 2
30	GASEXST6	SPECIATE 3900, GASOLINE EXHAUST - WINTER, NON-SMOKER
31	GASEXST7	SPECIATE 3904, GASOLINE EXHAUST - WINTER, SMOKER PROFILE 1
32	GASEXST8	SPECIATE 3908, GASOLINE EXHAUST - WINTER, SMOKER PROFILE 2
33	DESLXST1	SPECIATE 3878, DIESEL EXHAUST PROFILE 1
34	DESLXST2	SPECIATE 3879, DIESEL EXHAUST PROFILE 2
35	DESLXST3	SPECIATE 3880, DIESEL EXHAUST PROFILE 3
36	DESLXST4	SPECIATE 3912, DIESEL EXHAUST PROFILE 4
37	DESLXST5	SPECIATE 3913, DIESEL EXHAUST PROFILE 5
38	DESLXST6	SPECIATE 3914, DIESEL EXHAUST PROFILE 6
39	D_TRAINF	DIESEL TRAIN (SENT FROM MISSOULA)

40	D_TRUCKF	DIESEL TRUCK (SENT FROM MISSOULA)
41	TIRE_WR1	SPECIATE 340022.5, TIRE WEAR PROFILE 1
42	TIRE_WR2	SPECIATE 340032.5, TIRE WEAR PROFILE 2
43	TIRE_WR3	SPECIATE 340082.5, TIRE WEAR PROFILE 3
44	TIRE_WR4	SPECIATE 3156, TIRE WEAR PROFILE 4
45	BRAKEASB	SPECIATE 340042.5, BRAKE LINING – ASBESTOS
46	BRAKEWER	SPECIATE 3157, BRAKE WEAR
47	MTCOOKCH	SPECIATE 160002.5, MEAT COOKING – CHARBROILING
48	MTCOOKFR	SPECIATE 160012.5, MEAT COOKING – FRYING
49	COOKING1	SPECIATE 4383, COOKING
50	COOKCHAR	SPECIATE 91005, COOKING - CHARBROILING COMPOSITE
51	DEICER_F	MAGNESIUM CHLORIDE DEICER (CHEMICAL ANALYSIS SENT FROM MISSOULA)
52	RWC_MEDF	SPECIATE 421042.5 RESIDENTIAL WOOD SMOKE FROM MEDFORD, OR
53	RWC_POCF	SPECIATE 421052.5 RESIDENTIAL WOOD SMOKE FROM POCATELLO, ID
54	RWC_F222	RESIDENTIAL WOOD COMBUSTION (SUPPLIED BY MISSOULA)
55	RWC_ALON	SPECIATE 423182.5, RESIDENTIAL WOOD COMBUSTION
56	RWC_COMP	SPECIATE 423032.5, RESIDENTIAL WOOD COMBUSTION, COMPOSITE
57	RWB_COMP	SPECIATE 423302.5, COMPOSITE OF RESIDENTIAL WOODBURNING SOURCES
58	WDSTVALL	SPECIATE 421022.5, WOOD STOVES - AVERAGE ALL FUELS
59	WDSTVPIN	SPECIATE 421012.5, WOOD STOVES - PINE FUELS
60	RSWDBRN1	SPECIATE 3235, RESIDENTIAL WOOD BURNING PROFILE 1
61	RSWDBRN2	SPECIATE 3236, RESIDENTIAL WOOD BURNING PROFILE 2
62	RSWDBRN3	SPECIATE 3238, RESIDENTIAL WOOD BURNING PROFILE 3
63	RSWDBRN4	SPECIATE 3239, RESIDENTIAL WOOD BURNING PROFILE 4
64	RSWDBRN5	SPECIATE 3240, RESIDENTIAL WOOD BURNING PROFILE 5
65	RSWDBRN6	SPECIATE 3769, RESIDENTIAL WOOD BURNING PROFILE 6
66	RSWDBRN7	SPECIATE 3770, RESIDENTIAL WOOD BURNING PROFILE 7
67	RWCCOMP1	SPECIATE 423192.5, RESIDENTIAL WOOD COMBUSTION COMPOSITE
68	RWCCOMP2	SPECIATE 423312.5, RESIDENTIAL WOODSTOVE COMPOSITE
69	RWCHSCMP	SPECIATE 91031, RESIDENTIAL WOOD COMBUSTION: HARD/SOFT - COMPOSITE
70	RWCHSNAC	SPECIATE 91032, RESIDENTIAL WOOD COMBUSTION: HARD/SOFT/N/A - COMPOSITE
71	RWCSFTCP	SPECIATE 91033, RESIDENTIAL WOOD COMBUSTION: SOFT - COMPOSITE
72	GRAINDST	SPECIATE 214012.5, GRAIN HANDLING DUST
73	CMNTKILN	SPECIATE 272032.5, CEMENT KILN (COAL-FIRED)
74	GYPSCALC	SPECIATE 275012.5, GYPSUM CALCINER
75	SOILDUST	SPECIATE 413062.5, SOIL DUST - EAST HELENA, MONTANA

6.2 CMB Model Program QA/QC

A comprehensive QA/QC plan was applied throughout the CMB modeling program to ensure accurate results, including the use of the CMB validation protocol (Watson et al., 2004). The QA/QC protocol:

- 1) determines model applicability;
- 2) selects a variety of profiles to represent identified contributors;
- 3) evaluates model outputs and performance measures;
- 4) identifies and evaluates deviations from model assumptions;
- 5) identifies and corrects model input deficiencies;
- 6) verifies consistency and stability of source contribution estimates; and

7) evaluates CMB results with respect to other data analysis and source assessment methods.

For each model run, evaluations of several different combinations of source profiles were used, with the number of chemical species always exceeding the number of source types. Statistical parameters used to evaluate the validity of source contribution estimates included TSTAT, R², Chi², DF, and R/U ratios, and are described in Table 2. These fitting parameters have to be within the EPA target ranges for the modeling results to be considered valid. It should also be noted that concentrations of species found on field/trip blanks were not subtracted (or blank-corrected) from the ambient sample concentrations before the modeling was conducted.

Table 2: Statistical Criteria for CMB Model.

Output / Statistic	Abbreviation	EPA Target	Explanation
Std. Error	STD ERR	<SCE	The standard error of the SCE.
T-statistic	TSTAT	> 2.0	The ratio of the value of the SCE to the uncertainty in the SCE. A T-STAT greater than 2 means that the SCE has a relative uncertainty of less than 50%.
R-square	R-SQUARE (R ²)	0.8 to 1.0	A measure of the variance of the ambient concentration explained by the calculated concentration.
Chi-square	CHI-SQUARE (Chi ²)	0.0 to 4.0	A term that compares the difference between the calculated and measured ambient concentrations to the uncertainty of the difference. A perfect fit has a chi-square of 0.0, and a chi-square less than 2 usually indicates a good fit.
Percent Mass Explained	% MASS	100% ± 20%	The ratio of the total calculated to measured mass.
Degrees of Freedom	DF	> 5	The difference between the number of fitting species and the number of fitting sources.
Ratio of Calculated to Measured	RATIO C/M	0.5 to 2.0	The ratio of the calculated to measured concentration of an ambient species. Ideally, this value should be 1.0.
Ratio of Residual to Uncertainty	RATIO R/U	-2.0 to 2.0	The ratio of the residual (calculated minus measured) to the uncertainty of the residual (square root of the sum of squares of the uncertainties).

7.0 Results and Discussion

7.1 PM_{2.5} Mass and Speciation Data

The Hamilton PM_{2.5} samplers collected 24-hour integrated samples using Teflon and quartz filter media for the target analytes. From the pre-determined CMB sample days for this program, Figure 1 presents the 24-hour PM_{2.5} mass concentrations (in $\mu\text{g}/\text{m}^3$) measured from 11/2/07 through 3/1/08. Within Figure 1, the graphed sample concentrations can also be compared to the 24-hour (35 $\mu\text{g}/\text{m}^3$) and annual (15 $\mu\text{g}/\text{m}^3$) National Ambient Air Quality Standards (NAAQS).

From November 2007 through March 2008 (as measured every six days), 24-hour PM_{2.5} concentrations averaged 11.0 $\mu\text{g}/\text{m}^3$, with a maximum concentration of 43.1 $\mu\text{g}/\text{m}^3$ recorded on 1/25/08. There were also several scheduled sample days that did not have complete data sets (i.e. both a Teflon and quartz filter successfully collected). On 12/2/07 (24-hr avg mass of 3.4

$\mu\text{g}/\text{m}^3$), the quartz filter was not collected. For the Teflon filter sample collected on 12/20/07, there was a reported mass from DEQ of $0.2 \mu\text{g}/\text{m}^3$. However, no Teflon filter with this sample date was analyzed by Chester LabNet for elements. For the 1/1/08 and 1/31/08 sample days, neither the quartz or Teflon filter were collected. In presenting the final results within Section 7.0, these four sample days were excluded from both the averaged results of the speciated data, and the CMB modeling.

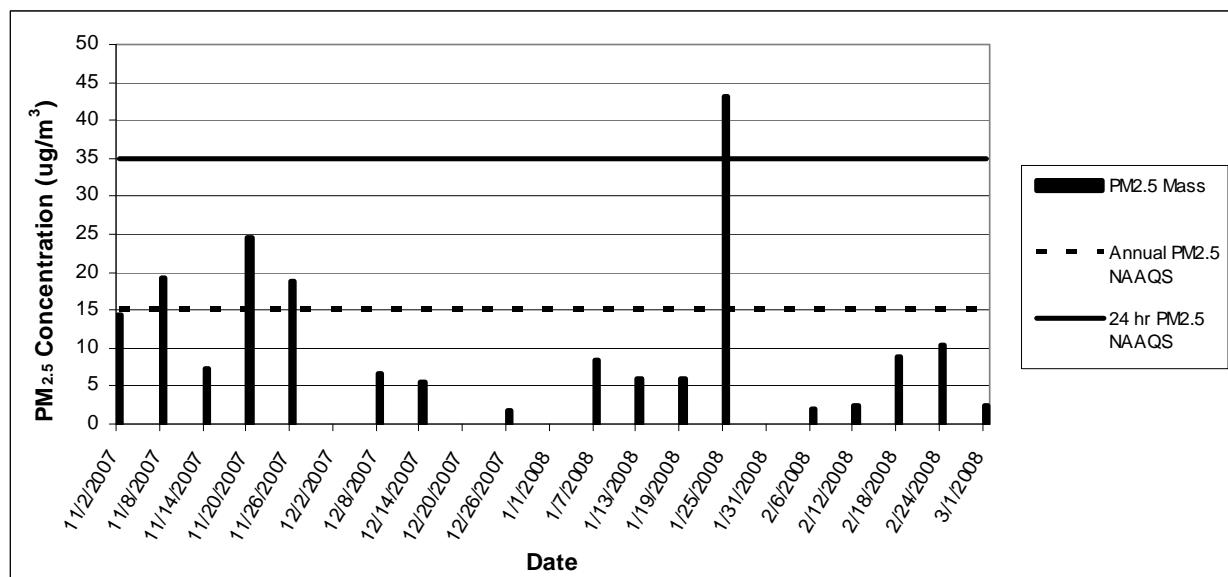


Figure 1: Hamilton, Montana PM_{2.5} Mass Concentrations.

Tables 3 through 5 present the average concentrations (in $\mu\text{g}/\text{m}^3$) of mass, elements, ions, and OC/EC, respectively, measured throughout the four-month sampling program. The minimum detection limits (MDL) in $\mu\text{g}/\text{m}^3$ for each compound are also presented in each table, with the bolded values indicating analyte concentrations measured at or above the MDL. For the elements, the MDL was calculated by taking the average uncertainty (per analyte) for all of the sample runs, and multiplying by three. The three-sigma uncertainty describes the range at 99.7% confidence. For anions and cations, the MDLs were provided by Chester LabNet. Finally, for OC/EC/TC (total carbon), it was recommended by Chester LabNet that the average of the field blanks be used for the MDL.

Table 3: Average PM_{2.5} Mass and Elemental Concentrations.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)	Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Mass	11.0	0.630			
Sodium	0.027	0.074	Germanium	0.001	0.001
Magnesium	0.006	0.019	Arsenic	0.000	0.002
Aluminum	0.020	0.015	Selenium	0.000	0.001
Silicon	0.065	0.020	Bromine	0.001	0.001
Phosphorus	0.000	0.003	Rubidium	0.000	0.001
Sulfur	0.178	0.029	Strontium	0.000	0.001
Chlorine	0.019	0.009	Yttrium	0.000	0.002
Potassium	0.061	0.013	Zirconium	0.001	0.002
Calcium	0.011	0.009	Molybdenum	0.000	0.003
Titanium	0.001	0.001	Palladium	0.001	0.007
Vanadium	0.000	0.001	Silver	0.001	0.007
Chromium	0.000	0.001	Cadmium	0.001	0.008
Manganese	0.001	0.002	Indium	0.001	0.008
Iron	0.014	0.007	Tin	0.003	0.010
Cobalt	0.000	0.004	Antimony	0.001	0.010
Nickel	0.001	0.002	Barium	0.002	0.005
Copper	0.001	0.002	Lanthanum	0.001	0.004
Zinc	0.007	0.004	Mercury	0.001	0.002
Gallium	0.000	0.001	Lead	0.003	0.003

Note: MDL—minimum detection limit. Bolded values indicate concentrations measured at or above the MDL.

Table 4: Average PM_{2.5} Ion Concentrations.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Sulfate	0.657	0.062
Nitrate	1.478	0.062
Ammonium	0.537	0.062
Chloride	0.068	0.062
Potassium	0.061	0.062
Fluoride	0.099	0.062
Sodium	0.598	0.125
Calcium	0.327	0.010
Magnesium	0.037	0.002

Table 5: Average PM_{2.5} Total, Elemental and Organic Carbon Concentrations.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Total Carbon	6.1	0.230
Organic Carbon	5.8	0.229
Elemental Carbon	0.36	0.001

Table 3 presents the average concentrations (in $\mu\text{g}/\text{m}^3$) of all of the elements measured throughout the sampling program. Out of the 38 elements, only 12 were measured at or above their reported MDL as noted by the bolded fonts. Sulfur ($0.178 \mu\text{g}/\text{m}^3$) had the highest concentration of the measured elements, followed by silicon ($0.065 \mu\text{g}/\text{m}^3$) and potassium ($0.061 \mu\text{g}/\text{m}^3$). With the exception of the potassium ion, the average concentrations of the ion species in Table 4, and the total carbon, organic carbon and elemental carbon in Table 5 were all measured above the MDLs. Nitrate ($1.5 \mu\text{g}/\text{m}^3$) had the highest concentration of any of the measured ions, while total carbon levels ($6.1 \mu\text{g}/\text{m}^3$) were mostly composed of organic carbon ($5.8 \mu\text{g}/\text{m}^3$).

7.2 Chemical Mass Balance Modeling

In total, four source profile types (see Figure 2) were identified as contributing to the Hamilton PM_{2.5} throughout the winter of 2007/2008, including street sand, secondary sulfate (SO₄), secondary ammonium nitrate (NH₄NO₃), and wood smoke.

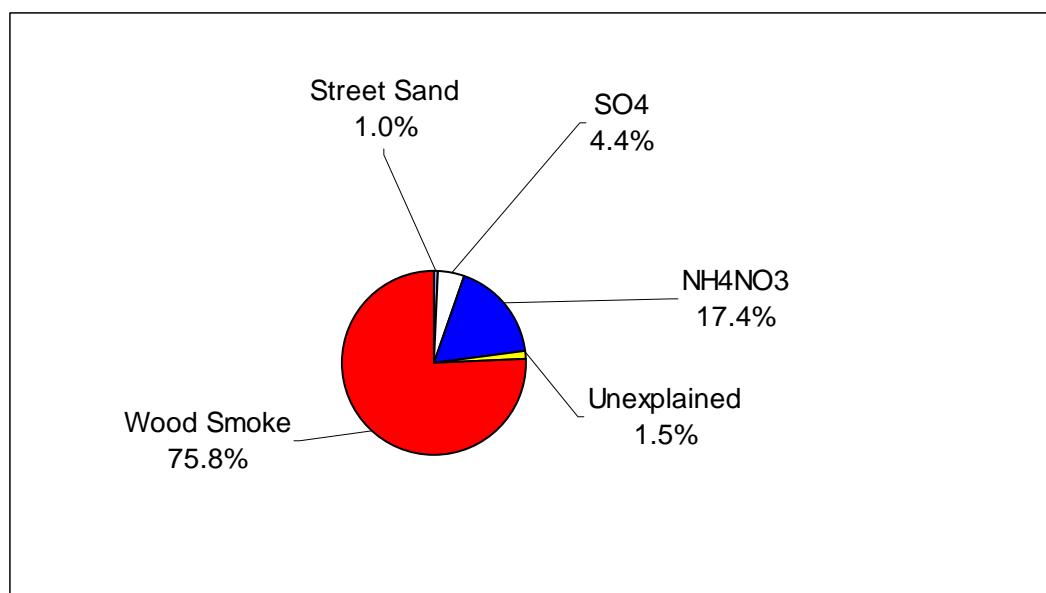


Figure 2: Hamilton, Montana PM_{2.5} Source Contribution Estimates.

As identified by the CMB model, wood smoke (likely wood stoves) was the largest source of PM_{2.5} in the Hamilton airshed (75.8%), followed by ammonium nitrate (17.4%), secondary sulfate (4.4%), and street sand (1.0%), respectively. An average of 1.5% of the measured PM_{2.5} was unexplained by the CMB model.

Wood smoke should be viewed as a general source predominantly composed of woodstove emissions. In addition to woodstoves, other biomass combustion emission sources could have contributed to this source profile, including smoke from prescribed fires, residential open burning of biomass waste, and small industrial sources.

Two secondary aerosols, ammonium nitrate (NH₄NO₃) and sulfate (SO₄), were identified by the CMB model as contributing to PM_{2.5} concentrations in Hamilton during the winter of 2007/2008. “Pure secondary” aerosols such as ammonium nitrate (17.4%) and sulfate (4.4%) are actually

formed through gas-to-particle transformations in the atmosphere, and are represented by their chemical form in the model. Ammonium nitrate is an extremely volatile species, and is not detected in the particle form during the warmer months. Ammonia (NH_3) and oxides of nitrogen (NO_x) are the precursors for ammonium nitrate particles (Seinfeld and Pandis, 1998), and a mechanism for the formation of ammonium nitrate has been reported by Stockwell et al., (2000). $\text{PM}_{2.5}$ has been found to correlate with gaseous emissions of NO_x from vehicles, with heavy duty vehicles contributing significantly greater amounts of NO_x and particulate matter on a per vehicle basis than light duty vehicles (Gillies et al., 2001). Between 40 and 45% of all NO_x emissions in the United States are estimated to come from transportation, with about half of this coming from light-duty gasoline trucks and cars and approximately one-quarter from heavy-duty gasoline and diesel vehicles (Seinfeld and Pandis, 1998; Dreher and Harley, 1998). Other sources of NO_x in the Bitterroot Valley might include small industry, natural gas furnaces, and residential wood combustion (Schmidt, 1996). Ammonia emissions to the atmosphere arise from many sources including the decay of livestock waste, use of chemical fertilizers, emissions from sewage treatment plants, biological processes in soils, and to a lesser extent, combustion processes (Fraser and Cass, 1998). The source of the secondary sulfate might include the transportation sector, the burning of fuel oils for home heating, and/or “normal” background levels.

The CMB model determined that vehicles were a negligible source of $\text{PM}_{2.5}$ in Hamilton. $\text{PM}_{2.5}$ emitted directly from gasoline-powered and diesel vehicles were not detected by the CMB model during the 2007/2008 Hamilton source apportionment program. Finally, street sand (1%) was detected in five of the 17 model runs, and is a minor contributor to the Hamilton $\text{PM}_{2.5}$ throughout the winter months.

Table 6 presents the $\text{PM}_{2.5}$ sources identified by the CMB model for each sample day throughout the 2007/2008 winter sampling program, while Appendix A presents their corresponding standard errors (STD ERR). The standard error is a single standard deviation. When a standard error value is multiplied by two or three times, the result may be taken as a measure of the upper and lower limit of an individual source’s contribution. There is about a 66% probability that the true source contribution is within one standard error and about a 95% probability that the true contribution is within two standard errors of the source contribution estimate. Appendix B presents the raw input files for the Hamilton CMB model (including the ambient data and source profiles), while Appendix C presents the final outputs for the Hamilton CMB model.

Table 6: PM_{2.5} Source Contribution Estimates (μg/m³) by Sample Day.

Date	PM _{2.5} Mass	Street Sand	Secondary Sulfate	Ammonium Nitrate	Wood Smoke	Unexplained Mass
11/2/2007	14.4	0.0	1.0	1.2	12.1	0.1
11/8/2007	19.2	1.1	1.1	1.5	15.5	0.0
11/14/2007	7.2	0.0	0.3	0.3	6.2	0.4
11/20/2007	24.6	0.0	2.8	2.2	20.3	-0.7
11/26/2007	18.7	0.0	0.5	4.8	13.4	0.0
12/2/2007*						
12/8/2007	6.6	0.0	0.4	0.9	5.2	0.1
12/14/2007	5.6	0.1	0.2	0.3	5.2	-0.1
12/20/2007*						
12/26/2007	1.8	0.0	0.1	0.1	1.7	-0.1
1/1/2008*						
1/7/2008	8.4	0.0	0.1	1.0	7.8	-0.6
1/13/2008	5.9	0.0	0.1	0.9	4.6	0.2
1/19/2008	6.0	0.0	0.3	1.2	4.5	0.0
1/25/2008	43.1	0.0	0.5	16.3	26.6	-0.2
1/31/2008*						
2/6/2008	1.9	0.0	0.1	0.2	1.9	-0.3
2/12/2008	2.4	0.1	0.1	0.1	2.2	-0.1
2/18/2008	8.8	0.4	0.2	0.8	7.8	-0.4
2/24/2008	10.4	0.0	0.2	1.5	8.5	0.2
3/1/2008	2.5	0.1	0.2	0.1	2.0	0.0
Average	11.0	0.1	0.5	2.0	8.6	-0.1

Notes: * – incomplete filter collection, so no CMB modeling runs on these days.

It should be noted that source apportionment was not conducted on four of the sample days (12/2/07, 12/20/07, 1/1/08, and 1/31/08) because of sampling / operator errors resulting in the Teflon and / or quartz filter not being collected. Source apportionment was conducted on several sample days in which there was a very small PM_{2.5} mass detected. If the measured concentration is less than 5 μg/m³, the percent mass may be outside of the acceptable ranges because the uncertainty in the mass measurement is approximately 1 to 2 μg/m³. This resulted in less than desirable statistical fittings for those days with low measured PM_{2.5} mass.

7.3 ¹⁴C Data

The University of Arizona's Accelerator Mass Spectrometry Laboratory Facility conducted ¹⁴C analyses on the quartz filter samples collected throughout the program in Hamilton. From these results, UA calculated the percent wood smoke component of the ambient PM_{2.5}, with these results presented in Table 7.

Table 7: ^{14}C Results.

Date	PM _{2.5} Mass ($\mu\text{g}/\text{m}^3$)	% PM _{2.5} Resulting from Wood Smoke
11/2/2007	14.4	90.6
11/8/2007	19.2	No ^{14}C Filter
11/14/2007	7.2	87.2
11/20/2007	24.6	89.4
11/26/2007	18.7	80.7
12/2/2007		No ^{14}C Filter
12/8/2007	6.6	77.1
12/14/2007	5.6	82.6
12/20/2007		63.5
12/26/2007	1.8	58.0
1/1/2008		No ^{14}C Filter
1/7/2008	8.4	80.5
1/13/2008	5.9	No ^{14}C Filter
1/19/2008	6	71.4
1/25/2008	43.1	89.9
1/31/2008		No ^{14}C Filter
2/6/2008	1.9	52.7
2/12/2008	2.4	59.9
2/18/2008	8.8	82.9
2/24/2008	10.4	84.7
3/1/2008	2.5	56.0
Average	11.0	75.4%

The following equation was provided by the University of Arizona to determine the wood smoke component of the measured ambient PM_{2.5}, where:

FM(total) = fraction modern carbon reported,
FM(wood) = fraction modern carbon of wood smoke,
FM(coal) = fraction modern carbon of fossil fuel,
FM (blank) = carbon measured on the blank filter.

$$Fm(\text{total}) = \frac{\text{mass(wood)}}{\text{mass(total)}} Fm(\text{wood}) + \frac{\text{mass(coal)}}{\text{mass(total)}} Fm(\text{coal}) + \frac{\text{mass(blank)}}{\text{mass(total)}} Fm(\text{blank}),$$

now if,

$$Fm(\text{blank}) = 0.459$$

$$\text{mass(blank)} = 0.014 \text{ mg}$$

$$Fm(\text{wood}) = 1.075$$

and we assume,

$$Fm(\text{coal}) = 0,$$

we get,

$$\text{mass(wood)} = \frac{(Fm(\text{total}) \times \text{mass(total)}) - (Fm(\text{blank}) \times \text{mass(blank)})}{Fm(\text{wood})}$$

and,

$$\%(\text{wood}) = \frac{\text{mass(wood)}}{\text{mass(total)}} \times 100.$$

As mass(blank) $\longrightarrow 0$, this becomes:

$$\%(\text{wood}) = \frac{Fm(\text{total})}{Fm(\text{wood})} \times 100$$

There are three assumptions that must be made before using this equation. The first assumption is that there are two distinct fractions for the sample (old and new carbon). The second assumption is that FM(coal) = 0, since the carbon source is ancient. The final assumption is that the FM(wood) is essentially that of modern atmospheric carbon, which is approximately 1.075.

When using the values for fraction of modern carbon for each sample (found in Table 7), the percent wood smoke component of the PM_{2.5} can be calculated. Results show that an average of 75.4% of the measured PM_{2.5} came from new carbon, or a wood smoke source. In summary, the ¹⁴C results confirm the wood smoke contribution (new carbon source) to the overall PM_{2.5} mass in the Hamilton airshed.

7.4 Sampling Program QA/QC

For the Hamilton sampling program, Montana DEQ maintained and audited the PM_{2.5} FRM samplers.

7.5 Analytical Program QA/QC

Chester LabNet (speciation analyses), IML (gravimetric analyses), and the University of Arizona (¹⁴C) were responsible for QA/QC activities within their respective laboratories. To monitor for artifact contamination in the field and in the laboratory, both Teflon and quartz filter field blanks were collected throughout the sampling programs. For the Teflon filters, eight total field blanks were collected throughout the entire four-community study, and analyzed for elements by Chester LabNet. Since UM-CEHS cannot determine from which airshed these filters came from, the average analyte concentrations ($\mu\text{g}/\text{filter}$) of these eight field blanks were calculated, and then divided by the program average sample volume collected (24.04 m^3). The Teflon filter field blank elemental results (including field blanks from Belgrade, Butte, Hamilton, and Helena) are presented in Table 8. For the quartz filter field blanks, results are community specific. Two quartz field blanks were collected throughout the four-month Hamilton program. From these

quartz filters, ions and OC/EC were analyzed, with the results ($\mu\text{g}/\text{filter}$) provided by Chester LabNet. These values were then divided by the average volumes collected throughout the Hamilton PM_{2.5} quartz filter sampling program (24.03 m^3). The quartz filter field blank results for ions, OC, and EC are presented in Tables 9 and 10.

Table 8: Average Field Blank Concentrations of PM_{2.5} Mass and Elements.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)	Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Mass	*	0.630			
Sodium	0.004	0.074	Germanium	0.000	0.001
Magnesium	0.001	0.019	Arsenic	0.000	0.002
Aluminum	0.001	0.015	Selenium	0.000	0.001
Silicon	0.000	0.020	Bromine	0.000	0.001
Phosphorus	0.000	0.003	Rubidium	0.000	0.001
Sulfur	0.000	0.029	Strontium	0.000	0.001
Chlorine	0.001	0.009	Yttrium	0.000	0.002
Potassium	0.000	0.013	Zirconium	0.000	0.002
Calcium	0.000	0.009	Molybdenum	0.000	0.003
Titanium	0.001	0.001	Palladium	0.000	0.007
Vanadium	0.000	0.001	Silver	0.001	0.007
Chromium	0.000	0.001	Cadmium	0.000	0.008
Manganese	0.000	0.002	Indium	0.001	0.008
Iron	0.000	0.007	Tin	0.002	0.010
Cobalt	0.000	0.004	Antimony	0.002	0.010
Nickel	0.001	0.002	Barium	0.003	0.005
Copper	0.001	0.002	Lanthanum	0.001	0.004
Zinc	0.000	0.004	Mercury	0.001	0.002
Gallium	0.001	0.001	Lead	0.002	0.003

Note: Bolded values indicate blank concentrations measured at or above the MDL. *UM-CEHS does not have this information.

Table 9: Average Field Blank Concentrations of Ions.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Sulfate	0.072	0.062
Nitrate	0.000	0.062
Ammonium	0.000	0.062
Chloride	0.000	0.062
Potassium	0.000	0.062
Fluoride	0.069	0.062
Sodium	0.421	0.125
Calcium	0.241	0.010
Magnesium	0.027	0.002

Note: Bolded values indicate blank concentrations measured above the MDL.

Table 10: Average Field Blank Concentrations of Elemental and Organic Carbon.

Analyte	Concentration ($\mu\text{g}/\text{m}^3$)	MDL ($\mu\text{g}/\text{m}^3$)
Total Carbon	0.203	0.230
Organic Carbon	0.203	0.229
Elemental Carbon	0.000	0.001

The results of the PM_{2.5} speciation field blank analyses show that the Teflon and quartz filters did not measure significant artifacts for elements or OC/EC. However, several of the ions (particularly sulfate, fluoride, sodium, calcium, and magnesium) showed concentrations in the blanks elevated above the reported MDL. Care was taken when utilizing these ions as fitting species to avoid inaccurate source apportionment to the fine PM.

7.6 CMB Program QA/QC

EPA's validation protocol (Watson et al., 2004) was followed throughout this CMB modeling program to ensure accurate results. For each model run, several different combinations of source profiles were evaluated, and the number of chemical species always exceeded the number of source types. The source contribution estimates and the statistics and diagnostic information were reviewed for each model run to determine the validity of the initial model results. The analysis was repeated by eliminating source profiles that gave negative source contribution estimates or standard errors that exceeded the source contribution estimates. When conducting the CMB model runs, only sources with TSTATs >2 were reported. If a TSTAT was <2, then the source was not considered a significant contributor for that sample day. The majority of the CMB fitting parameters used to evaluate the validity of source contribution estimates were well within EPA target ranges. Table 11 presents the program average key 'goodness-of-fit' statistics commonly evaluated for CMB models, the results for the Hamilton CMB runs, and the EPA target ranges for each parameter. The values for R², Chi², DF, and % mass explained for each CMB model run were generally well within the EPA target ranges. For the most part, the R/U ratios were all less than 2, and source collinearity (similarities between identified sources) was not a problem throughout this modeling application.

Table 11: Average Goodness-Of-Fit Parameters for the 2007/2008 Hamilton CMB.

Goodness-of-Fit Parameter	Hamilton CMB	EPA Target
R ²	0.96	0.8 - 1.00
Chi ²	0.33	0.00 - 4.0
Degrees of Freedom	37	> 5
% Mass Explained	101.5%	80 - 120%
TSTAT	>2	>2

It is believed that all of the PM_{2.5} emission sources (or at least the source types) were identified during the 2007/2008 Hamilton CMB modeling program. Missing source types are identified by a low percent mass explained (<80%) and/or a RATIO R/U <<-2.0 for chemical species which are in the missing source. In addition, a "high negative" residual for one or more species and a large Chi² can be indicative of missing sources. The good agreement between the calculated

source contributions and the measured ambient concentrations indicate that all of the major source types are included in the calculations, and that ambient and source profile measurements are reasonably accurate.

CMB is intended to complement rather than replace other data analysis and modeling methods. For this project, the sensitivity of the CMB model's results to the errors in the source profiles were evaluated by using different chemical abundances of a source type and by changing the fitting species used in the source type. The results of the sensitivity tests for each run showed that the CMB calculations carried out in this study were acceptable. Although there were a few cases where the fitting parameters were outside the EPA target range, none of these cases were considered invalid, and all of the fits were quite strong. Therefore, the source contribution estimates identified in this project can be considered valid.

8.0 References

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Appendix A: Source Contribution Estimates and Associated Standard Errors ($\mu\text{g}/\text{m}^3$) for Each Sample Day.

Date	PM _{2.5} Mass	Street Sand	Street Sand STD ERR	Sulfate	Sulfate STD ERR	Ammonium Nitrate	Ammonium Nitrate STD ERR	Wood Smoke	Wood Smoke STD ERR
11/2/2007	14.4	0.0	0.0	1.0	0.1	1.2	0.1	12.1	2.4
11/8/2007	19.2	1.1	0.5	1.1	0.1	1.5	0.2	15.5	3.0
11/14/2007	7.2	0.0	0.0	0.3	0.0	0.3	0.0	6.2	0.7
11/20/2007	24.6	0.0	0.0	2.8	0.3	2.2	0.4	20.3	1.3
11/26/2007	18.7	0.0	0.0	0.5	0.1	4.8	0.3	13.4	3.1
12/2/2007*									
12/8/2007	6.6	0.0	0.0	0.4	0.1	0.9	0.1	5.2	1.3
12/14/2007	5.6	0.1	0.0	0.2	0.0	0.3	0.0	5.2	0.6
12/20/2007*									
12/26/2007	1.8	0.0	0.0	0.1	0.0	0.1	0.0	1.7	0.3
1/1/2008*									
1/7/2008	8.4	0.0	0.0	0.1	0.0	1.0	0.1	7.8	0.9
1/13/2008	5.9	0.0	0.0	0.1	0.0	0.9	0.1	4.6	0.5
1/19/2008	6	0.0	0.0	0.3	0.0	1.2	0.1	4.5	0.6
1/25/2008	43.1	0.0	0.0	0.5	0.1	16.3	1.0	26.6	1.4
1/31/2008*									
2/6/2008	1.9	0.0	0.0	0.1	0.0	0.2	0.0	1.9	0.3
2/12/2008	2.4	0.1	0.0	0.1	0.0	0.1	0.0	2.2	0.3
2/18/2008	8.8	0.4	0.1	0.2	0.0	0.8	0.1	7.8	1.6
2/24/2008	10.4	0.0	0.0	0.2	0.0	1.5	0.1	8.5	1.9
3/1/2008	2.5	0.1	0.1	0.2	0.0	0.1	0.0	2.0	0.3
Average	11.0	0.1	0.04	0.5	0.1	2.0	0.2	8.6	1.2

Notes: * – incomplete filter collection, so no CMB modeling runs on these days.

Appendix B: Hamilton CMB Input Files (Ambient and Source Profiles)

TMAC	TOT	Mass by gravimetry (ug/m3)		C42	MO	Molybdenum by XRF (ug/m3)
C12	MG	Magnesium by XRF (ug/m3)		C46	PD	Palladium by XRF (ug/m3)
C13	AL	Aluminum by XRF (ug/m3)		C47	AG	Silver by XRF (ug/m3)
C14	SI	Silicon by XRF (ug/m3)		C48	CD	Cadmium by XRF (ug/m3)
C15	P	Phosphorus by XRF (ug/m3)		C49	IN	Indium by XRF (ug/m3)
C16	S	Sulfur by XRF (ug/m3)		C50	SN	Tin by XRF (ug/m3)
C17	CL	Chlorine by XRF (ug/m3)		C51	SB	Antimony by XRF (ug/m3)
C19	K	Potassium by XRF (ug/m3)		C56	BA	Barium by XRF (ug/m3)
C20	CA	Calcium by XRF (ug/m3)		C57	LA	Lanthanum by XRF (ug/m3)
C22	TI	Titanium by XRF (ug/m3)		C80	HG	Mercury by XRF (ug/m3)
C23	V	Vanadium by XRF (ug/m3)		C82	PB	Lead by XRF (ug/m3)
C24	CR	Chromium by XRF (ug/m3)		C200	TC	Total Carbon by TOR (ug/m3)
C25	MN	Manganese by XRF (ug/m3)		C201	OC	Organic Carbon by TOR (ug/m3)
C26	FE	Iron by XRF (ug/m3)		C202	EC	Elemental Carbon by TOR (ug/m3)
C28	NI	Nickel by XRF (ug/m3)		C203	SO4	Sulfate by IC (ug/m3)
C29	CU	Copper by XRF (ug/m3)		C204	NO3	Nitrate by IC (ug/m3)
C30	ZN	Zinc by XRF (ug/m3)		C205	NH4	Ammonia by IC (ug/m3)
C31	GA	Gallium by XRF (ug/m3)		C217	CL2	Chloride by IC (ug/m3)
C32	GE	Germanium by XRF (ug/m3)		C219	K2	Potassium by IC (ug/m3)
C33	AS	Arsenic by XRF (ug/m3)		C300	F2	Fluoride by IC (ug/m3)
C34	SE	Selenium by XRF (ug/m3)		C301	NA2	Sodium by IC (ug/m3)
C35	BR	Bromine by XRF (ug/m3)		C302	CA2	Calcium by ICP (ug/m3)
C37	RB	Rubidium by XRF (ug/m3)		C303	MG2	Magnesium by ICP (ug/m3)
C38	SR	Strontium by XRF (ug/m3)		C304	NA	Sodium by XRF (ug/m3)
C39	Y	Yttrium by XRF (ug/m3)		C305	CO	Cobalt by XRF (ug/m3)
C40	ZR	Zirconium by XRF (ug/m3)				

Hamilton Ambient PM_{2.5} Speciation Data

ID	Date	Dur	STHOUR	Size	TMAC	TMAU	C12	MG	C13	AL
HAMIL	11/2/2007	24	0	FINE	14.4	0.0001	0.0111	0.0060	0.0321	0.0061
HAMIL	11/8/2007	24	0	FINE	19.2	0.0001	0.0134	0.0063	0.0881	0.0091
HAMIL	11/14/2007	24	0	FINE	7.2	0.0001	0.0211	0.0092	0.0089	0.0041
HAMIL	11/20/2007	24	0	FINE	24.6	0.0001	0.0141	0.0066	0.0153	0.0056
HAMIL	11/26/2007	24	0	FINE	18.7	0.0001	0.0032	0.0055	0.0264	0.0054
HAMIL	12/2/2007	24	0	FINE	3.4					
HAMIL	12/8/2007	24	0	FINE	6.6	0.0001	0.0000	0.0054	0.0130	0.0049
HAMIL	12/14/2007	24	0	FINE	5.6	0.0001	0.0051	0.0049	0.0000	0.0022
HAMIL	12/20/2007	24	0	FINE	0.2	0.0001	0.0000	0.0000	0.0000	0.0000
HAMIL	12/26/2007	24	0	FINE	1.8	0.0001	0.0000	0.0050	0.0065	0.0034
HAMIL	1/1/2008	24	0	FINE	AF					
HAMIL	1/7/2008	24	0	FINE	8.4	0.0001	0.0002	0.0055	0.0008	0.0026
HAMIL	1/13/2008	24	0	FINE	5.9	0.0001	0.0000	0.0049	0.0012	0.0026
HAMIL	1/19/2008	24	0	FINE	6	0.0001	0.0093	0.0054	0.0076	0.0041
HAMIL	1/25/2008	24	0	FINE	43.1	0.0001	0.0000	0.0067	0.0162	0.0054
HAMIL	1/31/2008	24	0	FINE	AF					
HAMIL	2/6/2008	24	0	FINE	1.9	0.0001	0.0000	0.0049	0.0025	0.0025
HAMIL	2/12/2008	24	0	FINE	2.4	0.0001	0.0000	0.0048	0.0113	0.0041
HAMIL	2/18/2008	24	0	FINE	8.8	0.0001	0.0205	0.0099	0.0680	0.0072
HAMIL	2/24/2008	24	0	FINE	10.4	0.0001	0.0000	0.0052	0.0146	0.0048
HAMIL	3/1/2008	24	0	FINE	2.5	0.0001	0.0066	0.0052	0.0137	0.0047

Date	C14	SI	C15	P	C16	S	C17	CL	C19	K
11/2/2007	0.1189	0.0081	0.0000	0.0013	0.3435	0.0185	0.0049	0.0024	0.1149	0.0063
11/8/2007	0.2756	0.0170	0.0000	0.0014	0.3999	0.0213	0.0038	0.0023	0.1317	0.0071
11/14/2007	0.0321	0.0032	0.0000	0.0010	0.1134	0.0070	0.0081	0.0019	0.0585	0.0035
11/20/2007	0.0556	0.0048	0.0000	0.0016	0.9692	0.0500	0.0201	0.0032	0.1674	0.0089
11/26/2007	0.0835	0.0061	0.0008	0.0012	0.1889	0.0108	0.0226	0.0026	0.0743	0.0043
12/2/2007										
12/8/2007	0.0715	0.0053	0.0000	0.0010	0.1439	0.0115	0.0019	0.0021	0.0419	0.0027
12/14/2007	0.0000	0.0014	0.0004	0.0008	0.0000	0.0007	0.0000	0.0015	0.0003	0.0009
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0209	0.0023	0.0000	0.0008	0.0358	0.0039	0.0095	0.0022	0.0104	0.0014
1/1/2008										
1/7/2008	0.0168	0.0022	0.0000	0.0009	0.0459	0.0044	0.0235	0.0027	0.0384	0.0025
1/13/2008	0.0116	0.0023	0.0000	0.0010	0.0478	0.0048	0.0163	0.0021	0.0368	0.0024
1/19/2008	0.0175	0.0026	0.0004	0.0011	0.1211	0.0075	0.0119	0.0022	0.0465	0.0029
1/25/2008	0.0529	0.0046	0.0027	0.0013	0.2070	0.0118	0.0913	0.0057	0.1334	0.0072
1/31/2008										
2/6/2008	0.0131	0.0023	0.0000	0.0009	0.0305	0.0033	0.0699	0.0045	0.0199	0.0017
2/12/2008	0.0233	0.0028	0.0000	0.0009	0.0407	0.0037	0.0000	0.0016	0.0112	0.0013
2/18/2008	0.1933	0.0121	0.0000	0.0011	0.0943	0.0080	0.0108	0.0021	0.0570	0.0034
2/24/2008	0.0288	0.0032	0.0000	0.0011	0.0984	0.0064	0.0195	0.0024	0.0328	0.0023
3/1/2008	0.0483	0.0041	0.0000	0.0011	0.0781	0.0055	0.0096	0.0022	0.0171	0.0016

Hamilton Ambient PM_{2.5} Speciation Data, cont.

Date	C20	CA	C22	TI	C23	V	C24	CR	C25	MN
11/2/2007	0.0268	0.0018	0.0026	0.0005	0.0000	0.0004	0.0008	0.0004	0.0000	0.0006
11/8/2007	0.0366	0.0024	0.0046	0.0006	0.0000	0.0004	0.0007	0.0004	0.0012	0.0006
11/14/2007	0.0082	0.0013	0.0005	0.0003	0.0000	0.0003	0.0000	0.0003	0.0000	0.0005
11/20/2007	0.0150	0.0016	0.0011	0.0004	0.0007	0.0003	0.0000	0.0004	0.0022	0.0006
11/26/2007	0.0109	0.0014	0.0025	0.0004	0.0006	0.0003	0.0000	0.0004	0.0010	0.0005
12/2/2007										
12/8/2007	0.0081	0.0010	0.0011	0.0005	0.0006	0.0003	0.0000	0.0004	0.0001	0.0006
12/14/2007	0.0000	0.0059	0.0010	0.0004	0.0004	0.0003	0.0000	0.0004	0.0000	0.0006
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0018	0.0007	0.0010	0.0004	0.0002	0.0003	0.0002	0.0004	0.0000	0.0006
1/1/2008										
1/7/2008	0.0083	0.0009	0.0012	0.0004	0.0000	0.0003	0.0005	0.0005	0.0003	0.0006
1/13/2008	0.0076	0.0008	0.0008	0.0004	0.0010	0.0003	0.0005	0.0004	0.0013	0.0006
1/19/2008	0.0091	0.0014	0.0014	0.0004	0.0000	0.0003	0.0000	0.0004	0.0005	0.0006
1/25/2008	0.0201	0.0015	0.0000	0.0005	0.0000	0.0003	0.0000	0.0004	0.0000	0.0006
1/31/2008										
2/6/2008	0.0016	0.0012	0.0006	0.0004	0.0002	0.0003	0.0001	0.0004	0.0011	0.0006
2/12/2008	0.0027	0.0012	0.0000	0.0005	0.0000	0.0003	0.0000	0.0004	0.0003	0.0005
2/18/2008	0.0143	0.0016	0.0040	0.0005	0.0001	0.0003	0.0000	0.0004	0.0006	0.0006
2/24/2008	0.0033	0.0013	0.0001	0.0004	0.0011	0.0004	0.0000	0.0004	0.0011	0.0006
3/1/2008	0.0093	0.0014	0.0018	0.0005	0.0011	0.0004	0.0001	0.0004	0.0004	0.0006

Date	C26	FE	C28	NI	C29	CU	C30	ZN	C31	GA
11/2/2007	0.0228	0.0015	0.0014	0.0011	0.0004	0.0008	0.0115	0.0012	0.0000	0.0006
11/8/2007	0.0513	0.0028	0.0000	0.0010	0.0000	0.0008	0.0110	0.0012	0.0005	0.0006
11/14/2007	0.0081	0.0008	0.0003	0.0008	0.0006	0.0007	0.0064	0.0009	0.0000	0.0005
11/20/2007	0.0141	0.0011	0.0016	0.0010	0.0015	0.0008	0.0138	0.0013	0.0000	0.0006
11/26/2007	0.0210	0.0014	0.0010	0.0009	0.0024	0.0008	0.0118	0.0012	0.0006	0.0005
12/2/2007										
12/8/2007	0.0118	0.0011	0.0000	0.0010	0.0000	0.0009	0.0039	0.0009	0.0022	0.0006
12/14/2007	0.0000	0.0008	0.0011	0.0007	0.0000	0.0006	0.0001	0.0005	0.0007	0.0004
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0029	0.0009	0.0002	0.0007	0.0000	0.0007	0.0006	0.0005	0.0010	0.0004
1/1/2008										
1/7/2008	0.0074	0.0011	0.0022	0.0007	0.0004	0.0007	0.0073	0.0008	0.0007	0.0005
1/13/2008	0.0029	0.0008	0.0019	0.0010	0.0006	0.0008	0.0037	0.0009	0.0003	0.0006
1/19/2008	0.0160	0.0066	0.0016	0.0010	0.0007	0.0008	0.0055	0.0009	0.0009	0.0005
1/25/2008	0.0195	0.0013	0.0014	0.0010	0.0029	0.0009	0.0215	0.0016	0.0000	0.0005
1/31/2008										
2/6/2008	0.0049	0.0009	0.0016	0.0010	0.0006	0.0008	0.0073	0.0010	0.0003	0.0005
2/12/2008	0.0043	0.0008	0.0000	0.0009	0.0000	0.0008	0.0004	0.0008	0.0001	0.0005
2/18/2008	0.0342	0.0020	0.0014	0.0010	0.0009	0.0008	0.0033	0.0008	0.0000	0.0005
2/24/2008	0.0044	0.0009	0.0001	0.0010	0.0016	0.0008	0.0041	0.0009	0.0009	0.0005
3/1/2008	0.0076	0.0010	0.0000	0.0011	0.0000	0.0009	0.0034	0.0009	0.0002	0.0006

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Date	C32	GE	C33	AS	C34	SE	C35	BR	C37	RB
11/2/2007	0.0007	0.0006	0.0012	0.0009	0.0003	0.0005	0.0014	0.0005	0.0008	0.0006
11/8/2007	0.0005	0.0005	0.0000	0.0008	0.0000	0.0004	0.0029	0.0005	0.0004	0.0005
11/14/2007	0.0001	0.0004	0.0009	0.0004	0.0005	0.0003	0.0019	0.0004	0.0004	0.0004
11/20/2007	0.0000	0.0005	0.0000	0.0009	0.0001	0.0004	0.0016	0.0004	0.0015	0.0005
11/26/2007	0.0009	0.0005	0.0000	0.0008	0.0003	0.0004	0.0020	0.0004	0.0003	0.0005
12/2/2007										
12/8/2007	0.0011	0.0005	0.0008	0.0005	0.0007	0.0005	0.0012	0.0004	0.0001	0.0005
12/14/2007	0.0006	0.0004	0.0008	0.0003	0.0006	0.0003	0.0000	0.0003	0.0000	0.0003
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0005	0.0004	0.0000	0.0006	0.0000	0.0003	0.0002	0.0003	0.0002	0.0003
1/1/2008										
1/7/2008	0.0003	0.0004	0.0000	0.0006	0.0000	0.0003	0.0014	0.0003	0.0000	0.0003
1/13/2008	0.0004	0.0005	0.0000	0.0004	0.0007	0.0004	0.0005	0.0004	0.0001	0.0005
1/19/2008	0.0015	0.0005	0.0000	0.0005	0.0010	0.0004	0.0018	0.0004	0.0000	0.0005
1/25/2008	0.0000	0.0005	0.0002	0.0008	0.0000	0.0004	0.0021	0.0005	0.0002	0.0005
1/31/2008										
2/6/2008	0.0000	0.0005	0.0000	0.0004	0.0000	0.0004	0.0010	0.0004	0.0004	0.0005
2/12/2008	0.0008	0.0005	0.0000	0.0007	0.0002	0.0004	0.0014	0.0004	0.0004	0.0005
2/18/2008	0.0000	0.0005	0.0014	0.0005	0.0001	0.0004	0.0013	0.0004	0.0005	0.0005
2/24/2008	0.0011	0.0005	0.0006	0.0005	0.0006	0.0004	0.0024	0.0004	0.0003	0.0005
3/1/2008	0.0005	0.0006	0.0017	0.0005	0.0000	0.0005	0.0001	0.0005	0.0006	0.0006

Date	C38	SR	C39	Y	C40	ZR	C42	MO	C46	PD
11/2/2007	0.0000	0.0007	0.0000	0.0008	0.0013	0.0010	0.0019	0.0016	0.0000	0.0024
11/8/2007	0.0013	0.0007	0.0008	0.0008	0.0004	0.0010	0.0000	0.0015	0.0004	0.0024
11/14/2007	0.0000	0.0005	0.0006	0.0006	0.0001	0.0008	0.0030	0.0012	0.0000	0.0020
11/20/2007	0.0021	0.0006	0.0007	0.0008	0.0020	0.0009	0.0000	0.0014	0.0032	0.0024
11/26/2007	0.0000	0.0006	0.0000	0.0007	0.0007	0.0009	0.0000	0.0013	0.0000	0.0022
12/2/2007										
12/8/2007	0.0009	0.0007	0.0002	0.0008	0.0000	0.0010	0.0007	0.0015	0.0000	0.0023
12/14/2007	0.0000	0.0004	0.0001	0.0004	0.0014	0.0006	0.0000	0.0008	0.0000	0.0025
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0000	0.0004	0.0005	0.0005	0.0000	0.0006	0.0000	0.0008	0.0000	0.0026
1/1/2008										
1/7/2008	0.0001	0.0004	0.0000	0.0005	0.0000	0.0006	0.0000	0.0009	0.0000	0.0027
1/13/2008	0.0002	0.0006	0.0000	0.0008	0.0011	0.0010	0.0000	0.0014	0.0000	0.0023
1/19/2008	0.0000	0.0006	0.0008	0.0008	0.0016	0.0010	0.0008	0.0014	0.0000	0.0023
1/25/2008	0.0000	0.0006	0.0001	0.0008	0.0006	0.0010	0.0000	0.0014	0.0000	0.0022
1/31/2008										
2/6/2008	0.0000	0.0006	0.0000	0.0008	0.0014	0.0009	0.0004	0.0014	0.0000	0.0022
2/12/2008	0.0000	0.0006	0.0000	0.0007	0.0000	0.0008	0.0000	0.0013	0.0000	0.0023
2/18/2008	0.0008	0.0006	0.0018	0.0008	0.0000	0.0009	0.0000	0.0014	0.0000	0.0022
2/24/2008	0.0001	0.0006	0.0000	0.0008	0.0012	0.0010	0.0000	0.0015	0.0009	0.0023
3/1/2008	0.0000	0.0007	0.0000	0.0008	0.0013	0.0011	0.0000	0.0016	0.0027	0.0024

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Date	C47	AG	C48	CD	C49	IN	C50	SN	C51	SB
11/2/2007	0.0023	0.0025	0.0008	0.0024	0.0002	0.0029	0.0000	0.0034	0.0029	0.0036
11/8/2007	0.0019	0.0025	0.0034	0.0025	0.0000	0.0027	0.0070	0.0034	0.0001	0.0036
11/14/2007	0.0016	0.0022	0.0000	0.0021	0.0000	0.0024	0.0015	0.0031	0.0058	0.0032
11/20/2007	0.0000	0.0024	0.0019	0.0024	0.0000	0.0026	0.0004	0.0034	0.0003	0.0036
11/26/2007	0.0000	0.0022	0.0000	0.0023	0.0026	0.0026	0.0048	0.0032	0.0000	0.0033
12/2/2007										
12/8/2007	0.0000	0.0023	0.0000	0.0025	0.0000	0.0026	0.0000	0.0033	0.0017	0.0037
12/14/2007	0.0000	0.0027	0.0001	0.0028	0.0000	0.0031	0.0022	0.0034	0.0000	0.0037
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0006	0.0028	0.0000	0.0031	0.0000	0.0032	0.0000	0.0035	0.0000	0.0038
1/1/2008										
1/7/2008	0.0011	0.0029	0.0029	0.0031	0.0016	0.0033	0.0000	0.0037	0.0000	0.0039
1/13/2008	0.0019	0.0023	0.0000	0.0024	0.0000	0.0026	0.0000	0.0032	0.0000	0.0035
1/19/2008	0.0000	0.0024	0.0020	0.0025	0.0000	0.0026	0.0004	0.0033	0.0000	0.0035
1/25/2008	0.0000	0.0023	0.0032	0.0024	0.0000	0.0026	0.0000	0.0032	0.0000	0.0035
1/31/2008										
2/6/2008	0.0000	0.0022	0.0021	0.0024	0.0000	0.0026	0.0015	0.0033	0.0054	0.0035
2/12/2008	0.0013	0.0022	0.0031	0.0024	0.0042	0.0025	0.0034	0.0032	0.0012	0.0034
2/18/2008	0.0032	0.0024	0.0024	0.0025	0.0000	0.0027	0.0129	0.0036	0.0063	0.0035
2/24/2008	0.0040	0.0024	0.0000	0.0024	0.0025	0.0028	0.0056	0.0034	0.0006	0.0036
3/1/2008	0.0000	0.0024	0.0000	0.0024	0.0008	0.0028	0.0011	0.0035	0.0000	0.0038

Date	C56	BA	C57	LA	C80	HG	C82	PB	C200	TC
11/2/2007	0.0017	0.0018	0.0006	0.0016	0.0019	0.0012	0.0048	0.0014	8.3430	0.5695
11/8/2007	0.0023	0.0018	0.0000	0.0017	0.0000	0.0011	0.0039	0.0013	11.0362	0.7041
11/14/2007	0.0021	0.0014	0.0009	0.0012	0.0000	0.0009	0.0011	0.0010	5.1457	0.4072
11/20/2007	0.0032	0.0017	0.0000	0.0015	0.0000	0.0010	0.0096	0.0014	11.5855	0.7291
11/26/2007	0.0014	0.0016	0.0012	0.0014	0.0022	0.0010	0.0051	0.0012	8.9425	0.5995
12/2/2007										
12/8/2007	0.0043	0.0018	0.0016	0.0016	0.0033	0.0012	0.0002	0.0013	3.9650	0.3481
12/14/2007	0.0028	0.0013	0.0000	0.0008	0.0006	0.0007	0.0000	0.0009	4.2613	0.3630
12/20/2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.2956	0.4157
12/26/2007	0.0005	0.0014	0.0004	0.0009	0.0008	0.0007	0.0015	0.0009	1.4282	0.2212
1/1/2008										
1/7/2008	0.0023	0.0016	0.0017	0.0010	0.0013	0.0008	0.0014	0.0010	6.2422	0.4628
1/13/2008	0.0006	0.0017	0.0028	0.0015	0.0003	0.0011	0.0022	0.0012	4.7191	0.3860
1/19/2008	0.0000	0.0017	0.0000	0.0015	0.0024	0.0011	0.0028	0.0012	3.7453	0.3371
1/25/2008	0.0073	0.0017	0.0020	0.0015	0.0000	0.0011	0.0044	0.0013	17.4282	1.0187
1/31/2008										
2/6/2008	0.0000	0.0016	0.0005	0.0014	0.0000	0.0011	0.0000	0.0011	1.7720	0.2381
2/12/2008	0.0073	0.0015	0.0011	0.0013	0.0019	0.0010	0.0026	0.0010	2.1024	0.2547
2/18/2008	0.0027	0.0017	0.0002	0.0016	0.0011	0.0011	0.0000	0.0012	5.5930	0.4290
2/24/2008	0.0013	0.0017	0.0019	0.0015	0.0024	0.0011	0.0028	0.0012	6.5945	0.4796
3/1/2008	0.0017	0.0018	0.0014	0.0016	0.0014	0.0012	0.0016	0.0013	1.5980	0.2297

Hamilton Ambient PM_{2.5} Speciation Data, cont.

Date	C201	OC	C202	EC	C203	SO4	C204	NO3	C205	NH4
11/2/2007	7.7435	0.4875	0.5945	0.1294	1.1865	0.0595	0.8868	0.0445	0.5329	0.0266
11/8/2007	10.2372	0.6142	0.7940	0.1398	1.3691	0.0687	1.0404	0.0520	0.6242	0.0311
11/14/2007	4.9167	0.3457	0.2293	0.1114	0.4246	0.0212	0.2523	0.0126	0.0799	0.0040
11/20/2007	11.0362	0.6492	0.5893	0.1293	3.1794	0.1590	1.4815	0.0741	1.3400	0.0670
11/26/2007	8.2431	0.5146	0.7044	0.1349	0.6661	0.0333	3.6012	0.1799	1.1699	0.0587
12/2/2007										
12/8/2007	3.7703	0.2886	0.1918	0.1094	0.5410	0.0270	0.6825	0.0342	0.2235	0.0112
12/14/2007	4.1298	0.3061	0.1333	0.1064	0.3358	0.0168	0.2072	0.0104	0.0000	0.0624
12/20/2007	5.2456	0.3617	0.0779	0.1039	0.1261	0.0063	0.0812	0.0041	0.0000	0.0624
12/26/2007	1.3433	0.1673	0.0824	0.1039	0.1735	0.0087	0.0787	0.0039	0.0000	0.0624
1/1/2008										
1/7/2008	5.7928	0.3900	0.4648	0.1233	0.1985	0.0099	0.7824	0.0391	0.2222	0.0111
1/13/2008	4.5526	0.3276	0.1673	0.1084	0.2397	0.0120	0.7740	0.0387	0.1773	0.0089
1/19/2008	3.5605	0.2777	0.1873	0.1094	0.4661	0.0233	0.8864	0.0441	0.3021	0.0151
1/25/2008	16.2797	0.9139	1.1635	0.1583	0.7824	0.0392	12.4428	0.6201	3.8410	0.1923
1/31/2008										
2/6/2008	1.7171	0.1857	0.0524	0.1023	0.2059	0.0103	0.1285	0.0064	0.0000	0.0624
2/12/2008	2.0025	0.1998	0.0984	0.1049	0.2547	0.0127	0.0986	0.0049	0.0000	0.0624
2/18/2008	5.2934	0.3640	0.2981	0.1149	0.3995	0.0200	0.5868	0.0293	0.2147	0.0107
2/24/2008	6.3447	0.4167	0.2568	0.1129	0.4022	0.0201	1.1032	0.0554	0.3959	0.0198
3/1/2008	1.5431	0.1768	0.0564	0.1029	0.3483	0.0174	0.0999	0.0050	0.0000	0.0624

Date	C217	CL2	C219	K2	C300	F2	C301	NA2	C302	CA2
11/2/2007	0.0999	0.0050	0.1274	0.0064	0.1087	0.0054	0.4871	0.0244	0.3664	0.0183
11/8/2007	0.0000	0.0624	0.1136	0.0057	0.1049	0.0052	0.4911	0.0246	0.3654	0.0183
11/14/2007	0.0000	0.0624	0.0712	0.0036	0.0937	0.0047	0.4704	0.0236	0.3047	0.0152
11/20/2007	0.0724	0.0036	0.1673	0.0084	0.1311	0.0066	0.6034	0.0301	0.4952	0.0247
11/26/2007	0.0787	0.0039	0.0849	0.0042	0.1149	0.0057	0.5704	0.0285	0.4413	0.0220
12/2/2007										
12/8/2007	0.0000	0.0624	0.0000	0.0624	0.0824	0.0041	0.5576	0.0279	0.3342	0.0167
12/14/2007	0.0724	0.0036	0.0000	0.0624	0.0924	0.0046	2.4677	0.1232	0.4661	0.0232
12/20/2007	0.0000	0.0624	0.0000	0.0624	0.0737	0.0037	0.4871	0.0244	0.2785	0.0139
12/26/2007	0.0637	0.0032	0.0000	0.0624	0.0899	0.0045	0.5035	0.0252	0.3629	0.0181
1/1/2008										
1/7/2008	0.0737	0.0037	0.0000	0.0624	0.0787	0.0039	0.3283	0.0164	0.1856	0.0093
1/13/2008	0.2197	0.0110	0.2285	0.0114	0.1411	0.0071	0.5618	0.0281	0.2959	0.0148
1/19/2008	0.0687	0.0034	0.0000	0.0624	0.0724	0.0036	0.4145	0.0207	0.3055	0.0153
1/25/2008	0.1873	0.0094	0.1735	0.0087	0.1548	0.0077	0.4286	0.0214	0.2597	0.0130
1/31/2008										
2/6/2008	0.1423	0.0071	0.0649	0.0032	0.1023	0.0051	0.5075	0.0255	0.2612	0.0131
2/12/2008	0.0000	0.0624	0.0000	0.0624	0.0712	0.0036	0.4702	0.0235	0.2634	0.0132
2/18/2008	0.0000	0.0624	0.0000	0.0624	0.0924	0.0046	0.4453	0.0222	0.3005	0.0150
2/24/2008	0.0799	0.0040	0.0000	0.0624	0.0874	0.0044	0.4288	0.0214	0.3160	0.0158
3/1/2008	0.0000	0.0624	0.0000	0.0624	0.0662	0.0033	0.4370	0.0218	0.2293	0.0115

Hamilton Ambient PM_{2.5} Speciation Data, cont.

Date	C303	MG2	C304	NA	C305	CO
11/2/2007	0.0388	0.0020	0.0708	0.0358	0.0000	0.0013
11/8/2007	0.0376	0.0019	0.0312	0.0158	0.0000	0.0013
11/14/2007	0.0360	0.0018	0.0423	0.0295	0.0000	0.0010
11/20/2007	0.0429	0.0021	0.0312	0.0177	0.0000	0.0012
11/26/2007	0.0407	0.0020	0.0000	0.0151	0.0000	0.0011
12/2/2007						
12/8/2007	0.0361	0.0018	0.0236	0.0135	0.0000	0.0013
12/14/2007	0.0687	0.0035	0.0266	0.0330	0.0000	0.0013
12/20/2007	0.0329	0.0016	0.0000	0.0000	0.0000	0.0000
12/26/2007	0.0383	0.0019	0.0356	0.0276	0.0003	0.0014
1/1/2008						
1/7/2008	0.0216	0.0011	0.0002	0.0282	0.0000	0.0015
1/13/2008	0.0357	0.0018	0.0130	0.0127	0.0000	0.0012
1/19/2008	0.0376	0.0019	0.0795	0.0328	0.0000	0.0012
1/25/2008	0.0299	0.0015	0.0321	0.0195	0.0000	0.0012
1/31/2008						
2/6/2008	0.0369	0.0018	0.0240	0.0134	0.0000	0.0012
2/12/2008	0.0297	0.0015	0.0108	0.0115	0.0000	0.0011
2/18/2008	0.0365	0.0018	0.0271	0.0137	0.0000	0.0012
2/24/2008	0.0377	0.0019	0.0165	0.0137	0.0000	0.0013
3/1/2008	0.0297	0.0015	0.0182	0.0128	0.0000	0.0013

Hamilton PM_{2.5} Source Profiles

PNO	SID	SIZE	C12	MG	C13	AL	C14	SI	C15	P
HAML01	ST_SANDF	FINE	0.001711	0.000172	0.086563	0.012623	0.215927	0.031127	0	0.000399
HAML02	ERN_RUSF	FINE	0.003032	0.000307	0.07822	0.011493	0.213167	0.030867	0	0.0004
HAML03	RUS_STF2	FINE	0.002852	0.000301	0.077316	0.011654	0.213645	0.031554	0	0.000463
HAML04	DESP_LTF	FINE	0.00099	0.0001	0.089841	0.01315	0.224711	0.032514	0	0.000404
HAML05	RDDST_BT	FINE	0	0.0001	0.1349	0.0135	0.3485	0.0349	0.0041	0.0004
HAML06	RDDST_CP	FINE	0.0084	0.0021	0.0792	0.0145	0.2148	0.0278	0.0011	0.0004
HAML07	RDDST_HE	FINE	0	0.0001	0.0882	0.0088	0.2633	0.0263	0.0029	0.0004
HAML08	RDDST_MS	FINE	0.01	0.0013	0.081	0.01	0.238	0.03	0	0.0001
HAML09	UNDST_CP	FINE	0	0.0001	0.1524	0.0154	0.3351	0.0337	0.0031	0.0003
HAML10	UNDST_HE	FINE	0	0.0001	0.1334	0.0133	0.3742	0.0374	0.0022	0.0003
HAML11	S04_FZER	FINE	0	0.1	0	0.1	0	0.1	0	0.1
HAML12	NH4SO4F2	FINE	0	0.00001	0	0.000001	0	0.00001	0	0.000001
HAML13	NH4NO3F2	FINE	0	0.00001	0	0.00001	0	0.00001	0	0.000001
HAML14	LDV_PBCF	FINE	0	0.1	0.00656	0.001312	0.01187	0.002374	0.00301	0.000602
HAML15	LDV_XPBF	FINE	0	0.1	0.00699	0.00281	0.03427	0.01755	0.00441	0.00164
HAML16	LDV_DSLF	FINE	0	0.1	0.00007	0.00004	0.00202	0.00177	0.00026	0.00015
HAML17	LDV_DS2F	FINE	0	0.1	0.00009	0.00007	0.00053	0.00028	0.00026	0.00008
HAML18	HDV_DSLF	FINE	0	0.1	0.00003	0.00026	0.00018	0.00018	0.00042	0.00009
HAML19	LDV_NCAT	FINE	0	0.0001	0.0073	0.0001	0.0039	0.0001	0.0048	0.0001
HAML20	LDV_WCAT	FINE	0	0.0001	0.0007	0.0001	0.0004	0.0001	0.0017	0.0001
HAML21	HDV_TRK1	FINE	0.009	0.0015	0.01	0.002	0.016	0.002	0.0015	0.0002
HAML22	HDV_TRK2	FINE	0	0.0001	0.0005	0.0001	0.0059	0.0001	0.0003	0.0001
HAML23	LDV_UNL1	FINE	0	0.0001	0.0012	0.0001	0.0051	0.0001	0	0.0001
HAML24	LDV_UNL2	FINE	0	0.0001	0.0015	0.0013	0.0624	0.0397	0.0004	0.0004
HAML25	GASEXST1	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML26	GASEXST2	FINE	0.002309	0.001365	0.002104	0.000937	0.007517	0.003151	0.004076	0.001365
HAML27	GASEXST3	FINE	0.002754	0.002177	0.001611	0.001473	0.005431	0.000742	0.002105	0.000254
HAML28	GASEXST4	FINE	0.000588	0.000477	0.00065	0.000417	0.003066	0.000703	0.001395	0.001362
HAML29	GASEXST5	FINE	0.000115	0.000151	0.000221	0.00006	0.003874	0.000058	0.000403	0.000032
HAML30	GASEXST6	FINE	0.001571	0.001008	0.001481	0.001049	0.005609	0.003284	0.002927	0.001898
HAML31	GASEXST7	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML32	GASEXST8	FINE	0	0.0001	0	0.0001	0	0.000487	0.000634	0.0001
HAML33	DESLXST1	FINE	0.000881	0.000891	0.0004	0.000957	0.005101	0.001284	0.000344	0.000349
HAML34	DESLXST2	FINE	0.000982	0.001039	0.000467	0.001159	0.005527	0.00143	0.000379	0.000392
HAML35	DESLXST3	FINE	0.000802	0.000782	0.000352	0.000815	0.004754	0.001208	0.000316	0.000315
HAML36	DESLXST4	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML37	DESLXST5	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML38	DESLXST6	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML39	D_TRAINF	FINE	0	0.00001	0	0.000156	0.002987	0.000127	0.00062	0.000327
HAML40	D_TRUCKF	FINE	0	0.00001	0.000189	0.000042	0.0006	0.00003	0.000038	0.000075
HAML41	TIRE_WR1	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML42	TIRE_WR2	FINE	0.0004	0.0001	0.0007	0.0001	0.0005	0.0001	0.0025	0.0001
HAML43	TIRE_WR3	FINE	0.0004	0.0001	0.0005	0.0001	0.0018	0.0001	0	0.0001
HAML44	TIRE_WR4	FINE	0.0004	-99	0.0006	-99	0.0012	-99	0.0013	-99
HAML45	BRAKEASB	FINE	0.138	0.0001	0.0022	0.0001	0.108	0.0001	0	0.0001
HAML46	BRAKEWER	FINE	0.083	-99	0.0003	-99	0.0679	-99	0	-99
HAML47	MTCOOKCH	FINE	0.0091	0.0001	0.0008	0.0001	0.0011	0.0001	0.001	0.0001
HAML48	MTCOOKFR	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML49	COOKING1	FINE	0.001905	0.002633	0.000651	0.000825	0.004782	0.00446	0.000048	0.000285
HAML50	COOKCHAR	FINE	0.000956	0.0001	0.000521	0.0001	0.00096	0.0001	0.000479	0.0001
HAML51	DEICER_F	FINE	0.404	0.04	0	0.1	0	0.1	0.00004	0.00003
HAML52	RWC_MEDF	FINE	0	0.00041	0	0.00085	0.00059	0.00056	0	0.0002
HAML53	RWC_POCF	FINE	0.00002	0.00001	0.00005	0.00004	0.00003	0.00003	0	0.00002
HAML54	RWC_F222	FINE	0	0.00001	0.000051	0.000044	0.000493	0.00003	0.000074	0.000072
HAML55	RWC_ALON	FINE	0.0007	0.0002	0.0002	0.0001	0	0.0001	0	0.0001
HAML56	RWC_COMP	FINE	0.0007	0.0002	0.0002	0.0001	0	0.0001	0	0.0001
HAML57	RWB_COMP	FINE	0.0002	0.0001	0.0001	0.0001	0	0.0001	0	0.0001
HAML58	WDSTVALL	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML59	WDSTVPIN	FINE	0	0.0001	0	0.0001	0	0.0001	0	0.0001
HAML60	RSWDBRN1	FINE	0	0.0001	0	0.000078	0.000261	0.000222	0	0.000052
HAML61	RSWDBRN2	FINE	0	0.0001	0	0.000062	0.000169	0.000198	0	0.000053
HAML62	RSWDBRN3	FINE	0	0.0001	0	0.000056	0.000002	0.000023	0	0.000025
HAML63	RSWDBRN4	FINE	0	0.0001	0.000037	0.000061	0.000139	0.000015	0	0.000027
HAML64	RSWDBRN5	FINE	0	0.0001	0	0.000051	0.000457	0.000019	0	0.000027

Hamilton PM_{2.5} Source Profiles, cont.

PNO	SID	C305	CO
HAML01	ST_SANDF	0	0.0001
HAML02	ERN_RUSF	0	0.0001
HAML03	RUS_STF2	0	0.0001
HAML04	DESP_LTF	0	0.0001
HAML05	RDDST_BT	0	0.0001
HAML06	RDDST_CP	0	0.0001
HAML07	RDDST_HE	0	0.0001
HAML08	RDDST_MS	0	0.0001
HAML09	UNDST_CP	0	0.0001
HAML10	UNDST_HE	0	0.0001
HAML11	S04_FZER	0	0.0001
HAML12	NH4SO4F2	0	0.0001
HAML13	NH4NO3F2	0	0.0001
HAML14	LDV_PBCF	0	0.0001
HAML15	LDV_XPBF	0	0.0001
HAML16	LDV_DSLF	0	0.0001
HAML17	LDV_DS2F	0	0.0001
HAML18	HDV_DSLF	0	0.0001
HAML19	LDV_NCAT	0	0.0001
HAML20	LDV_WCAT	0	0.0001
HAML21	HDV_TRK1	0	0.0001
HAML22	HDV_TRK2	0	0.0001
HAML23	LDV_UNL1	0	0.0001
HAML24	LDV_UNL2	0	0.0001
HAML25	GASEXST1	0	0.000076
HAML26	GASEXST2	0.000039	0.000437
HAML27	GASEXST3	0.000112	0.000393
HAML28	GASEXST4	0.000005	0.000149
HAML29	GASEXST5	0.000002	0.000132
HAML30	GASEXST6	0.000024	0.000312
HAML31	GASEXST7	0.000001	0.000097
HAML32	GASEXST8	0	0.000069
HAML33	DESLXST1	0.000001	0.000057
HAML34	DESLXST2	0.000001	0.000066
HAML35	DESLXST3	0.000001	0.00005
HAML36	DESLXST4	0	0.000063
HAML37	DESLXST5	0.000001	0.000057
HAML38	DESLXST6	0.000002	0.000038
HAML39	D_TRAINF	0	0.0001
HAML40	D_TRUCKF	0	0.0001
HAML41	TIRE_WR1	0	0.0001
HAML42	TIRE_WR2	0	0.0001
HAML43	TIRE_WR3	0	0.0001
HAML44	TIRE_WR4	0	0.0001
HAML45	BRAKEASB	0	0.0001
HAML46	BRAKEWER	0	0.0001
HAML47	MTCOOKCH	0	0.0001
HAML48	MTCOOKFR	0	0.0001
HAML49	COOKING1	0.000014	0.000092
HAML50	COOKCHAR	0.000008	0.0001
HAML51	DEICER_F	0	0.0001
HAML52	RWC_MEDF	0	0.0001
HAML53	RWC_POCF	0	0.0001
HAML54	RWC_F222	0	0.0001
HAML55	RWC_ALON	0	0.0001
HAML56	RWC_COMP	0	0.0001
HAML57	RWB_COMP	0	0.0001
HAML58	WDSTVALL	0	0.0001
HAML59	WDSTVPIN	0	0.0001
HAML60	RSWDBRN1	0	0.000006
HAML61	RSWDBRN2	0	0.000007
HAML62	RSWDBRN3	0.000001	0.000003
HAML63	RSWDBRN4	0.000002	0.000003
HAML64	RSWDBRN5	0.000001	0.000002

Appendix C: Hamilton CMB Final Outputs

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/12/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 11/2/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.94	% MASS	99.4
CHI SQUARE	0.32	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE	EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11 S04_FZER	0.96624	0.12148	7.95418		
YES HAML13 NH4NO3F2	1.24492	0.14338	8.68285		
YES HAML66 RSWDBRN7	12.10643	2.41125	5.02082		

14.31758

MEASURED CONCENTRATION FOR SIZE: FINE
14.4+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 2.88000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.12078 0.14334 2.41129

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML66

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	14.40000+- 0.00010	14.31758+- 2.40219	0.99+- 0.17	0.0	
C12	MG	* 0.01110+- 0.00600	0.00024+- 0.09662	0.02+- 8.70	-0.1	
C13	AL	* 0.03210+- 0.00610	0.00150+- 0.09665	0.05+- 3.01	-0.3	
C14	SI	* 0.11890+- 0.00810	0.00298+- 0.09666	0.03+- 0.81	-1.2	
C15	P	* 0.00000< 0.00130	0.00016< 0.09662	0.00< 0.00	0.0	
C16	S	* 0.34350+- 0.01850	0.34350+- 0.03567	1.00+- 0.12	0.0	
C17	CL	0.00490+- 0.00240	0.01554+- 0.09722	3.17+-19.90	0.1	
C19	K	* 0.11490+- 0.00630	0.11309+- 0.16748	0.98+- 1.46	0.0	
C20	CA	* 0.02680+- 0.00180	0.00374+- 0.09670	0.14+- 3.61	-0.2	
C22	TI	* 0.00260+- 0.00050	0.00000+- 0.09663	0.00+-37.17	0.0	
C23	V	* 0.00000< 0.00040	0.00000< 0.09663	0.00< 0.00	0.0	
C24	CR	* 0.00080+- 0.00040	0.00000+- 0.09663	0.00+-*****	0.0	
C25	MN	* 0.00000< 0.00060	0.00021< 0.09662	0.00< 0.00	0.0	
C26	FE	* 0.02280+- 0.00150	0.00202+- 0.09667	0.09+- 4.24	-0.2	
C28	NI	* 0.00140+- 0.00110	0.00000+- 0.09663	0.00+-69.02	0.0	
C29	CU	* 0.00040< 0.00080	0.00005< 0.09662	0.12<*****	0.0	
C30	ZN	* 0.01150+- 0.00120	0.00364+- 0.09664	0.32+- 8.40	-0.1	
C31	GA	* 0.00000< 0.00060	0.00000< 0.09663	0.00< 0.00	0.0	
C32	GE	* 0.00070+- 0.00060	0.00000+- 0.09663	0.00+-*****	0.0	
C33	AS	* 0.00120+- 0.00090	0.00000+- 0.09663	0.00+-80.53	0.0	
C34	SE	* 0.00030< 0.00050	0.00000< 0.09663	0.00<*****	0.0	
C35	BR	0.00140+- 0.00050	0.00008+- 0.09662	0.06+-69.02	0.0	
C37	RB	* 0.00080+- 0.00060	0.00007+- 0.09662	0.09+-*****	0.0	
C38	SR	* 0.00000< 0.00070	0.00002< 0.09662	0.00< 0.00	0.0	
C39	Y	* 0.00000< 0.00080	0.00000< 0.09663	0.00< 0.00	0.0	
C40	ZR	* 0.00130+- 0.00100	0.00000+- 0.09663	0.00+-74.33	0.0	
C42	MO	* 0.00190+- 0.00160	0.00000+- 0.09663	0.00+-50.86	0.0	

C46	PD	*	0.00000<	0.00240	0.00004<	0.09662	0.00<	0.00	0.0
C47	AG	*	0.00230<	0.00250	0.00008<	0.09662	0.04<	42.01	0.0
C48	CD	*	0.00080<	0.00240	0.00007<	0.09662	0.09<	*****	0.0
C49	IN	*	0.00020<	0.00290	0.00000<	0.09663	0.00<	*****	0.0
C50	SN	*	0.00000<	0.00340	0.00016<	0.09662	0.00<	0.00	0.0
C51	SB	*	0.00290<	0.00360	0.00000<	0.09663	0.00<	33.32	0.0
C56	BA	*	0.00170<	0.00180	0.00076<	0.09663	0.45<	56.84	0.0
C57	LA	*	0.00060<	0.00160	0.00285<	0.09667	4.74<	*****	0.0
C80	HG	*	0.00190+-	0.00120	0.00000+-	0.09663	0.00+-	50.86	0.0
C82	PB	*	0.00480+-	0.00140	0.00000+-	0.09663	0.00+-	20.13	0.0
C200	TC		8.34300+-	0.56950	7.71913+-	1.51045	0.93+-	0.19	-0.4
C201	OC	*	7.74350+-	0.48750	6.21921+-	1.42235	0.80+-	0.19	-1.0
C202	EC	*	0.59450+-	0.12940	1.49993+-	0.51743	2.52+-	1.03	1.7
C203	SO4		1.18650+-	0.05950	0.11064+-	0.10706	0.09+-	0.09	-8.8
C204	NO3	*	0.88680+-	0.04450	0.97371+-	0.10805	1.10+-	0.13	0.7
C205	NH4	*	0.53290+-	0.02660	0.29549+-	0.10063	0.55+-	0.19	-2.3
C217	CL2	*	0.09990+-	0.00500	0.03120+-	0.09761	0.31+-	0.98	-0.7
C219	K2		0.12740+-	0.00640	0.16913+-	0.17023	1.33+-	1.34	0.2
C300	F2		0.10870+-	0.00540	0.00000+-	0.00122	0.00+-	0.01	-19.6
C301	NA2		0.48710+-	0.02440	0.00000+-	0.00122	0.00+-	0.00	-19.9
C302	CA2		0.36640+-	0.01830	0.00000+-	0.00122	0.00+-	0.00	-20.0
C303	MG2		0.03880+-	0.00200	0.00000+-	0.00122	0.00+-	0.03	-16.6
C304	NA		0.07080+-	0.03580	0.00065+-	0.00114	0.01+-	0.02	-2.0
C305	CO	*	0.00000<	0.00130	0.00000<	0.00122	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/12/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 11/8/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1

Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.95	% MASS	99.9
CHI SQUARE	0.28	DEGREES FREEDOM	36

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML08	RDDST_MS	1.14482	0.46186	2.47873
YES HAML11	S04_FZER	1.11753	0.14263	7.83508
YES HAML13	NH4NO3F2	1.45879	0.16654	8.75955
YES HAML66	RSWDBRN7	15.45838	3.02593	5.10864

19.17952

MEASURED CONCENTRATION FOR SIZE: FINE

19.2+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 4 FOR MAX. UNC. = 3.84000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.14169 0.16648 0.46147 3.02603

NUMBER ESTIMABLE SOURCES = 4 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML08 1.0000 HAML11 1.0000 HAML13 1.0000 HAML66

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES

COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	SCE	Std
Err					

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED	RESIDUAL	UNCERTAINTY
			CALCULATED	MEASURED	
TMAC	TMAU	19.20000+- 0.00010	19.17952+- 3.03010	1.00+- 0.16	0.0
C12	MG	* 0.01340+- 0.00630	0.01176+- 0.11176	0.88+- 8.35	0.0
C13	AL	* 0.08810+- 0.00910	0.09465+- 0.11238	1.07+- 1.28	0.1
C14	SI	* 0.27560+- 0.01700	0.27627+- 0.11696	1.00+- 0.43	0.0
C15	P	* 0.00000< 0.00140	0.00020< 0.11175	0.00< 0.00	0.0
C16	S	* 0.39990+- 0.02130	0.39990+- 0.04215	1.00+- 0.12	0.0
C17	CL	0.00380+- 0.00230	0.02019+- 0.11259	5.31+-29.80	0.1
C19	K	* 0.13170+- 0.00710	0.17073+- 0.20745	1.30+- 1.58	0.2
C20	CA	* 0.03660+- 0.00240	0.02424+- 0.11187	0.66+- 3.06	-0.1
C22	TI	* 0.00460+- 0.00060	0.00298+- 0.11176	0.65+-24.30	0.0
C23	V	* 0.00000< 0.00040	0.00000< 0.11176	0.00< 0.00	0.0
C24	CR	* 0.00070+- 0.00040	0.00000+- 0.11176	0.00+-*****	0.0
C25	MN	* 0.00120+- 0.00060	0.00061+- 0.11175	0.51+-93.13	0.0
C26	FE	* 0.05130+- 0.00280	0.03922+- 0.11192	0.76+- 2.18	-0.1
C28	NI	* 0.00000< 0.00100	0.00000< 0.11176	0.00< 0.00	0.0
C29	CU	* 0.00000< 0.00080	0.00132< 0.11175	0.00< 0.00	0.0
C30	ZN	* 0.01100+- 0.00120	0.00511+- 0.11178	0.46+-10.16	-0.1
C31	GA	* 0.00050< 0.00060	0.00000< 0.11176	0.00< *****	0.0
C32	GE	* 0.00050+- 0.00050	0.00000+- 0.11176	0.00+-*****	0.0
C33	AS	* 0.00000< 0.00080	0.00000< 0.11176	0.00< 0.00	0.0
C34	SE	* 0.00000< 0.00040	0.00000< 0.11176	0.00< 0.00	0.0
C35	BR	0.00290+- 0.00050	0.00011+- 0.11175	0.04+-38.54	0.0
C37	RB	* 0.00040< 0.00050	0.00009< 0.11175	0.23< *****	0.0
C38	SR	* 0.00130+- 0.00070	0.00003+- 0.11175	0.02+-85.96	0.0
C39	Y	* 0.00080+- 0.00080	0.00000+- 0.11176	0.00+-*****	0.0
C40	ZR	* 0.00040< 0.00100	0.00000< 0.11176	0.00< *****	0.0

C42	MO	*	0.00000<	0.00150	0.00000<	0.11176	0.00<	0.00	0.0
C46	PD	*	0.00040<	0.00240	0.00005<	0.11175	0.12< ****	0.0	
C47	AG	*	0.00190<	0.00250	0.00011<	0.11175	0.06< 58.82	0.0	
C48	CD	*	0.00340+-	0.00250	0.00009+-	0.11175	0.03+-32.87	0.0	
C49	IN	*	0.00000<	0.00270	0.00000<	0.11176	0.00<	0.00	0.0
C50	SN	*	0.00700+-	0.00340	0.00020+-	0.11175	0.03+-15.96	-0.1	
C51	SB	*	0.00010<	0.00360	0.00000<	0.11176	0.00< ****	0.0	
C56	BA	*	0.00230+-	0.00180	0.00097+-	0.11176	0.42+-48.59	0.0	
C57	LA	*	0.00000<	0.00170	0.00363<	0.11181	0.00<	0.00	0.0
C80	HG	*	0.00000<	0.00110	0.00000<	0.11176	0.00<	0.00	0.0
C82	PB	*	0.00390+-	0.00130	0.00149+-	0.11176	0.38+-28.66	0.0	
C200	TC	11.03620+-	0.70410	9.85635+-	1.92795	0.89+-	0.18	-0.6	
C201	OC	*	10.23720+-	0.61420	8.05562+-	1.81541	0.79+-	0.18	-1.1
C202	EC	*	0.79400+-	0.13980	1.93124+-	0.65862	2.43+-	0.93	1.7
C203	SO4	1.36910+-	0.06870	0.14127+-	0.12632	0.10+-	0.09	-8.5	
C204	NO3	*	1.04040+-	0.05200	1.14193+-	0.12530	1.10+-	0.13	0.7
C205	NH4	*	0.62420+-	0.03110	0.34788+-	0.11652	0.56+-	0.19	-2.3
C217	CL2	*	0.00000<	0.06240	0.03984<	0.11314	0.00<	0.00	0.3
C219	K2	0.11360+-	0.00570	0.21595+-	0.21099	1.90+-	1.86	0.5	
C300	F2	0.10490+-	0.00520	0.00000+-	0.00156	0.00+-	0.01	-19.3	
C301	NA2	0.49110+-	0.02460	0.00000+-	0.00156	0.00+-	0.00	-19.9	
C302	CA2	0.36540+-	0.01830	0.00000+-	0.00156	0.00+-	0.00	-19.9	
C303	MG2	0.03760+-	0.00190	0.00000+-	0.00156	0.00+-	0.04	-15.3	
C304	NA	0.03120+-	0.01580	0.00083+-	0.00145	0.03+-	0.05	-1.9	
C305	CO	*	0.00000<	0.00130	0.00000<	0.00156	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/12/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 11/14/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.99	% MASS	94.9
CHI SQUARE	0.08	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11 S04_FZER		0.31406	0.03767	8.33641
YES HAML13 NH4NO3F2		0.32834	0.04437	7.39966
YES HAML54 RWC_F222		6.18921	0.73788	8.38785

6.83160

MEASURED CONCENTRATION FOR SIZE: FINE
7.2+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 1.44000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.03754 0.04437 0.73788

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML54

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	7.20000+- 0.00010	6.83160+- 0.73702	0.95+- 0.10	-0.5	
C12	MG	* 0.02110+- 0.00920	0.00000+- 0.03141	0.00+- 1.49	-0.6	
C13	AL	* 0.00890+- 0.00410	0.00032+- 0.03141	0.04+- 3.53	-0.3	
C14	SI	* 0.03210+- 0.00320	0.00305+- 0.03141	0.10+- 0.98	-0.9	
C15	P	* 0.00000< 0.00100	0.00046< 0.03141	0.00< 0.00	0.0	
C16	S	* 0.11340+- 0.00700	0.11340+- 0.01037	1.00+- 0.11	0.0	
C17	CL	0.00810+- 0.00190	0.01149+- 0.03141	1.42+- 3.89	0.1	
C19	K	* 0.05850+- 0.00350	0.02195+- 0.03141	0.38+- 0.54	-1.2	
C20	CA	* 0.00820+- 0.00130	0.00783+- 0.03141	0.95+- 3.83	0.0	
C22	TI	* 0.00050+- 0.00030	0.00029+- 0.03141	0.58+-62.82	0.0	
C23	V	* 0.00000< 0.00030	0.00004< 0.03141	0.00< 0.00	0.0	
C24	CR	* 0.00000< 0.00030	0.00003< 0.03141	0.00< 0.00	0.0	
C25	MN	* 0.00000< 0.00050	0.00036< 0.03141	0.00< 0.00	0.0	
C26	FE	* 0.00810+- 0.00080	0.00069+- 0.03141	0.08+- 3.88	-0.2	
C28	NI	* 0.00030< 0.00080	0.00001< 0.03141	0.02< *****	0.0	
C29	CU	* 0.00060< 0.00070	0.00000< 0.03141	0.00< 52.34	0.0	
C30	ZN	* 0.00640+- 0.00090	0.00179+- 0.03141	0.28+- 4.91	-0.1	
C31	GA	* 0.00000< 0.00050	0.00000< 0.03141	0.00< 0.00	0.0	
C32	GE	* 0.00010< 0.00040	0.00000< 0.03141	0.00< *****	0.0	
C33	AS	* 0.00090+- 0.00040	0.00000+- 0.03141	0.00+-34.90	0.0	
C34	SE	* 0.00050+- 0.00030	0.00004+- 0.03141	0.07+-62.81	0.0	
C35	BR	0.00190+- 0.00040	0.00012+- 0.03141	0.06+-16.53	-0.1	
C37	RB	* 0.00040+- 0.00040	0.00011+- 0.03141	0.26+-78.51	0.0	
C38	SR	* 0.00000< 0.00050	0.00026< 0.03141	0.00< 0.00	0.0	
C39	Y	* 0.00060+- 0.00060	0.00000+- 0.03141	0.00+-52.34	0.0	
C40	ZR	* 0.00010< 0.00080	0.00031< 0.03141	3.09< *****	0.0	
C42	MO	* 0.00300+- 0.00120	0.00000+- 0.03141	0.00+-10.47	-0.1	

C46	PD	*	0.00000<	0.00200	0.00000<	0.03141	0.00<	0.00	0.0
C47	AG	*	0.00160<	0.00220	0.00000<	0.03141	0.00<	19.63	-0.1
C48	CD	*	0.00000<	0.00210	0.00000<	0.03141	0.00<	0.00	0.0
C49	IN	*	0.00000<	0.00240	0.00000<	0.03141	0.00<	0.00	0.0
C50	SN	*	0.00150<	0.00310	0.00000<	0.03141	0.00<	20.94	0.0
C51	SB	*	0.00580+-	0.00320	0.00043+-	0.03141	0.07+-	5.42	-0.2
C56	BA	*	0.00210+-	0.00140	0.00160+-	0.03145	0.76+-	14.98	0.0
C57	LA	*	0.00090<	0.00120	0.00000<	0.03141	0.00<	34.90	0.0
C80	HG	*	0.00000<	0.00090	0.00006<	0.03141	0.00<	0.00	0.0
C82	PB	*	0.00110+-	0.00100	0.00061+-	0.03141	0.56+-	28.56	0.0
C200	TC		5.14570+-	0.40720	5.21750+-	0.50272	1.01+-	0.13	0.1
C201	OC	*	4.91670+-	0.34570	5.01326+-	0.50231	1.02+-	0.12	0.2
C202	EC	*	0.22930+-	0.11140	0.20424+-	0.03746	0.89+-	0.46	-0.2
C203	SO4		0.42460+-	0.02120	0.00000+-	0.03141	0.00+-	0.07	-11.2
C204	NO3	*	0.25230+-	0.01260	0.25446+-	0.03389	1.01+-	0.14	0.1
C205	NH4	*	0.07990+-	0.00400	0.07388+-	0.03226	0.92+-	0.41	-0.2
C217	CL2	*	0.00000<	0.06240	0.00000<	0.03141	0.00<	0.00	0.0
C219	K2		0.07120+-	0.00360	0.00000+-	0.03141	0.00+-	0.44	-2.3
C300	F2		0.09370+-	0.00470	0.00000+-	0.00062	0.00+-	0.01	-19.8
C301	NA2		0.47040+-	0.02360	0.00000+-	0.00062	0.00+-	0.00	-19.9
C302	CA2		0.30470+-	0.01520	0.00000+-	0.00062	0.00+-	0.00	-20.0
C303	MG2		0.03600+-	0.00180	0.00000+-	0.00062	0.00+-	0.02	-18.9
C304	NA		0.04230+-	0.02950	0.00000+-	0.00062	0.00+-	0.01	-1.4
C305	CO	*	0.00000<	0.00100	0.00000<	0.00062	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/12/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 11/20/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.97	% MASS	102.9
CHI SQUARE	0.32	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	2.79969	0.31561	8.87076
YES HAML13	NH4NO3F2	2.18862	0.37303	5.86711
YES HAML69	RWCHSCMP	20.33210	1.29962	15.64462

25.32041

MEASURED CONCENTRATION FOR SIZE: FINE
24.6+- 0.0

Eligible Space Collinearity Display

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=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 4.92000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.31552 0.37301 1.29965

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

 1.0000 HAML11 1.0000 HAML13 1.0000 HAML69

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	24.60000+- 0.00010	25.32041+- 1.37839	1.03+- 0.06	0.5	
C12	MG	* 0.01410+- 0.00660	0.00230+- 0.27998	0.16+-19.86	0.0	
C13	AL	* 0.01530+- 0.00560	0.00224+- 0.27998	0.15+-18.30	0.0	
C14	SI	* 0.05560+- 0.00480	0.00691+- 0.27998	0.12+- 5.04	-0.2	
C15	P	* 0.00000< 0.00160	0.00081< 0.27998	0.00< 0.00	0.0	
C16	S	* 0.96920+- 0.05000	0.96920+- 0.09241	1.00+- 0.11	0.0	
C17	CL	0.02010+- 0.00320	0.04012+- 0.27998	2.00+-13.93	0.1	
C19	K	* 0.16740+- 0.00890	0.19662+- 0.27998	1.17+- 1.67	0.1	
C20	CA	* 0.01500+- 0.00160	0.00203+- 0.27998	0.14+-18.67	0.0	
C22	TI	* 0.00110+- 0.00040	0.00000+- 0.27998	0.00+-*****	0.0	
C23	V	* 0.00070+- 0.00030	0.00000+- 0.27998	0.00+-*****	0.0	
C24	CR	* 0.00000< 0.00040	0.00000< 0.27998	0.00< 0.00	0.0	
C25	MN	* 0.00220+- 0.00060	0.00000+- 0.27998	0.00+-*****	0.0	
C26	FE	* 0.01410+- 0.00110	0.00183+- 0.27998	0.13+-19.86	0.0	
C28	NI	* 0.00160+- 0.00100	0.00000+- 0.27998	0.00+-*****	0.0	
C29	CU	* 0.00150+- 0.00080	0.00000+- 0.27998	0.00+-*****	0.0	
C30	ZN	* 0.01380+- 0.00130	0.00447+- 0.27998	0.32+-20.29	0.0	
C31	GA	* 0.00000< 0.00060	0.00000< 0.27998	0.00< 0.00	0.0	
C32	GE	* 0.00000< 0.00050	0.00000< 0.27998	0.00< 0.00	0.0	
C33	AS	* 0.00000< 0.00090	0.00004< 0.27998	0.00< 0.00	0.0	
C34	SE	* 0.00010< 0.00040	0.00000< 0.27998	0.00< *****	0.0	
C35	BR	0.00160+- 0.00040	0.00049+- 0.27998	0.30+-*****	0.0	
C37	RB	* 0.00150+- 0.00050	0.00012+- 0.27998	0.08+-*****	0.0	
C38	SR	* 0.00210+- 0.00060	0.00000+- 0.27998	0.00+-*****	0.0	
C39	Y	* 0.00070< 0.00080	0.00000< 0.27998	0.00< *****	0.0	
C40	ZR	* 0.00200+- 0.00090	0.00000+- 0.27998	0.00+-*****	0.0	
C42	MO	* 0.00000< 0.00140	0.00000< 0.27998	0.00< 0.00	0.0	

C46	PD	*	0.00320+- 0.00240	0.00002+- 0.27998	0.01+-87.49	0.0
C47	AG	*	0.00000< 0.00240	0.00014< 0.27998	0.00< 0.00	0.0
C48	CD	*	0.00190< 0.00240	0.00014< 0.27998	0.07< *****	0.0
C49	IN	*	0.00000< 0.00260	0.00000< 0.27998	0.00< 0.00	0.0
C50	SN	*	0.00040< 0.00340	0.00020< 0.27998	0.51< *****	0.0
C51	SB	*	0.00030< 0.00360	0.00000< 0.27998	0.00< *****	0.0
C56	BA	*	0.00320+- 0.00170	0.00000+- 0.27998	0.00+-87.49	0.0
C57	LA	*	0.00000< 0.00150	0.00020< 0.27998	0.00< 0.00	0.0
C80	HG	*	0.00000< 0.00100	0.00000< 0.27998	0.00< 0.00	0.0
C82	PB	*	0.00960+- 0.00140	0.00012+- 0.27998	0.01+-29.16	0.0
C200	TC	11.58550+- 0.72910	0.00000+- 0.27998	0.00+- 0.02	-14.8	
C201	OC	*	11.03620+- 0.64920	10.73908+- 0.27998	0.97+- 0.06	-0.4
C202	EC	*	0.58930+- 0.12930	1.13436+- 0.27998	1.92+- 0.64	1.8
C203	SO4	3.17940+- 0.15900	0.08336+- 0.27998	0.03+- 0.09	-9.6	
C204	NO3	*	1.48150+- 0.07410	1.73481+- 0.29257	1.17+- 0.21	0.8
C205	NH4	*	1.34000+- 0.06700	0.52294+- 0.28428	0.39+- 0.21	-2.8
C217	CL2	*	0.07240+- 0.00360	0.00000+- 0.27998	0.00+- 3.87	-0.3
C219	K2	0.16730+- 0.00840	0.00000+- 0.27998	0.00+- 1.67	-0.6	
C300	F2	0.13110+- 0.00660	0.00000+- 0.00206	0.00+- 0.02	-19.0	
C301	NA2	0.60340+- 0.03010	0.00000+- 0.00206	0.00+- 0.00	-20.0	
C302	CA2	0.49520+- 0.02470	0.00000+- 0.00206	0.00+- 0.00	-20.0	
C303	MG2	0.04290+- 0.00210	0.00000+- 0.00206	0.00+- 0.05	-14.6	
C304	NA	0.03120+- 0.01770	0.01911+- 0.00206	0.61+- 0.35	-0.7	
C305	CO	*	0.00000< 0.00120	0.00000< 0.00206	0.00< 0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/12/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 11/26/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.98	% MASS	99.9
CHI SQUARE	0.24	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.49484	0.06165	8.02658
YES HAML13	NH4NO3F2	4.78506	0.29408	16.27118
YES HAML56	RWC_COMP	13.39846	3.10018	4.32184

18.67836

MEASURED CONCENTRATION FOR SIZE: FINE
18.7+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 3.74000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.05933 0.29408 3.10022

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML56

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	18.70000+- 0.00010	18.67836+- 3.09798	1.00+- 0.17	0.0	
C12	MG	* 0.00320< 0.00550	0.00938< 0.04956	2.93< 16.29	0.1	
C13	AL	* 0.02640+- 0.00540	0.00268+- 0.04950	0.10+- 1.88	-0.5	
C14	SI	* 0.08350+- 0.00610	0.00000+- 0.04950	0.00+- 0.59	-1.7	
C15	P	* 0.00080< 0.00120	0.00000< 0.04950	0.00< 61.88	0.0	
C16	S	* 0.18890+- 0.01080	0.18890+- 0.01655	1.00+- 0.10	0.0	
C17	CL	0.02260+- 0.00260	0.06833+- 0.04965	3.02+- 2.22	0.9	
C19	K	* 0.07430+- 0.00430	0.11523+- 0.04950	1.55+- 0.67	0.8	
C20	CA	* 0.01090+- 0.00140	0.00938+- 0.04950	0.86+- 4.54	0.0	
C22	TI	* 0.00250+- 0.00040	0.00000+- 0.04950	0.00+-19.80	-0.1	
C23	V	* 0.00060+- 0.00030	0.00000+- 0.04950	0.00+-82.50	0.0	
C24	CR	* 0.00000< 0.00040	0.00000< 0.04950	0.00< 0.00	0.0	
C25	MN	* 0.00100+- 0.00050	0.00000+- 0.04950	0.00+-49.50	0.0	
C26	FE	* 0.02100+- 0.00140	0.00000+- 0.04950	0.00+- 2.36	-0.4	
C28	NI	* 0.00100+- 0.00090	0.00000+- 0.04950	0.00+-49.50	0.0	
C29	CU	* 0.00240+- 0.00080	0.00000+- 0.04950	0.00+-20.63	0.0	
C30	ZN	* 0.01180+- 0.00120	0.00536+- 0.04950	0.45+- 4.20	-0.1	
C31	GA	* 0.00060+- 0.00050	0.00000+- 0.04950	0.00+-82.50	0.0	
C32	GE	* 0.00090+- 0.00050	0.00000+- 0.04950	0.00+-55.00	0.0	
C33	AS	* 0.00000< 0.00080	0.00000< 0.04950	0.00< 0.00	0.0	
C34	SE	* 0.00030< 0.00040	0.00000< 0.04950	0.00< *****	0.0	
C35	BR	0.00200+- 0.00040	0.00000+- 0.04950	0.00+-24.75	0.0	
C37	RB	* 0.00030< 0.00050	0.00000< 0.04950	0.00< *****	0.0	
C38	SR	* 0.00000< 0.00060	0.00000< 0.04950	0.00< 0.00	0.0	
C39	Y	* 0.00000< 0.00070	0.00000< 0.04950	0.00< 0.00	0.0	
C40	ZR	* 0.00070< 0.00090	0.00000< 0.04950	0.00< 70.72	0.0	
C42	MO	* 0.00000< 0.00130	0.00000< 0.04950	0.00< 0.00	0.0	

C46	PD	*	0.00000<	0.00220	0.00000<	0.04950	0.00<	0.00	0.0
C47	AG	*	0.00000<	0.00220	0.00000<	0.04950	0.00<	0.00	0.0
C48	CD	*	0.00000<	0.00230	0.00000<	0.04950	0.00<	0.00	0.0
C49	IN	*	0.00260+-	0.00260	0.00000+-	0.04950	0.00+-	19.04	-0.1
C50	SN	*	0.00480+-	0.00320	0.00000+-	0.04950	0.00+-	10.31	-0.1
C51	SB	*	0.00000<	0.00330	0.00000<	0.04950	0.00<	0.00	0.0
C56	BA	*	0.00140<	0.00160	0.00000<	0.04950	0.00<	35.36	0.0
C57	LA	*	0.00120<	0.00140	0.00000<	0.04950	0.00<	41.25	0.0
C80	HG	*	0.00220+-	0.00100	0.00000+-	0.04950	0.00+-	22.50	0.0
C82	PB	*	0.00510+-	0.00120	0.00000+-	0.04950	0.00+-	9.71	-0.1
C200	TC		8.94250+-	0.59950	0.00000+-	0.04950	0.00+-	0.01	-14.9
C201	OC	*	8.24310+-	0.51460	6.36427+-	1.84965	0.77+-	0.23	-1.0
C202	EC	*	0.70440+-	0.13490	1.71500+-	1.12656	2.43+-	1.67	0.9
C203	SO4		0.66610+-	0.03330	0.03886+-	0.04956	0.06+-	0.07	-10.5
C204	NO3	*	3.60120+-	0.17990	3.70842+-	0.19215	1.03+-	0.07	0.4
C205	NH4	*	1.16990+-	0.05870	1.07664+-	0.11854	0.92+-	0.11	-0.7
C217	CL2	*	0.07870+-	0.00390	0.00000+-	0.04950	0.00+-	0.63	-1.6
C219	K2		0.08490+-	0.00420	0.00000+-	0.04950	0.00+-	0.58	-1.7
C300	F2		0.11490+-	0.00570	0.00000+-	0.00142	0.00+-	0.01	-19.6
C301	NA2		0.57040+-	0.02850	0.00000+-	0.00142	0.00+-	0.00	-20.0
C302	CA2		0.44130+-	0.02200	0.00000+-	0.00142	0.00+-	0.00	-20.0
C303	MG2		0.04070+-	0.00200	0.00000+-	0.00142	0.00+-	0.03	-16.6
C304	NA		0.00000<	0.01510	0.00000<	0.00142	0.00<	0.00	0.0
C305	CO	*	0.00000<	0.00110	0.00000<	0.00142	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/23/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 12/8/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.95	% MASS	98.0
CHI SQUARE	0.29	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.41696	0.05443	7.66069
YES HAML13	NH4NO3F2	0.88501	0.07720	11.46393
YES HAML60	RSWDBRN1	5.16737	1.29859	3.97921

6.46934

MEASURED CONCENTRATION FOR SIZE: FINE
6.6+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 1.32000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.05429 0.07715 1.29860

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML60

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	6.60000+- 0.00010	6.46934+- 1.29555	0.98+- 0.20	-0.1	
C12	MG	* 0.00000< 0.00540	0.00000< 0.04170	0.00< 0.00	0.0	
C13	AL	* 0.01300+- 0.00490	0.00000+- 0.04170	0.00+- 3.21	-0.3	
C14	SI	* 0.07150+- 0.00530	0.00135+- 0.04171	0.02+- 0.58	-1.7	
C15	P	* 0.00000< 0.00100	0.00000< 0.04170	0.00< 0.00	0.0	
C16	S	* 0.14390+- 0.01150	0.14390+- 0.01395	1.00+- 0.13	0.0	
C17	CL	0.00190< 0.00210	0.00907< 0.04195	4.78< 22.70	0.2	
C19	K	* 0.04190+- 0.00270	0.01540+- 0.04391	0.37+- 1.05	-0.6	
C20	CA	* 0.00810+- 0.00100	0.00284+- 0.04183	0.35+- 5.16	-0.1	
C22	TI	* 0.00110+- 0.00050	0.00000+- 0.04170	0.00+-37.91	0.0	
C23	V	* 0.00060+- 0.00030	0.00000+- 0.04170	0.00+-69.49	0.0	
C24	CR	* 0.00000< 0.00040	0.00000< 0.04170	0.00< 0.00	0.0	
C25	MN	* 0.00010< 0.00060	0.00010< 0.04170	1.03< *****	0.0	
C26	FE	* 0.01180+- 0.00110	0.00019+- 0.04170	0.02+- 3.53	-0.3	
C28	NI	* 0.00000< 0.00100	0.00000< 0.04170	0.00< 0.00	0.0	
C29	CU	* 0.00000< 0.00090	0.00000< 0.04170	0.00< 0.00	0.0	
C30	ZN	* 0.00390+- 0.00090	0.00164+- 0.04173	0.42+-10.70	-0.1	
C31	GA	* 0.00220+- 0.00060	0.00000+- 0.04170	0.00+-18.95	-0.1	
C32	GE	* 0.00110+- 0.00050	0.00000+- 0.04170	0.00+-37.91	0.0	
C33	AS	* 0.00080+- 0.00050	0.00000+- 0.04170	0.00+-52.12	0.0	
C34	SE	* 0.00070+- 0.00050	0.00000+- 0.04170	0.00+-59.57	0.0	
C35	BR	0.00120+- 0.00040	0.00009+- 0.04170	0.07+-34.75	0.0	
C37	RB	* 0.00010< 0.00050	0.00000< 0.04170	0.00< *****	0.0	
C38	SR	* 0.00090+- 0.00070	0.00000+- 0.04170	0.00+-46.33	0.0	
C39	Y	* 0.00020< 0.00080	0.00000< 0.04170	0.00< *****	0.0	
C40	ZR	* 0.00000< 0.00100	0.00000< 0.04170	0.00< 0.00	0.0	
C42	MO	* 0.00070< 0.00150	0.00000< 0.04170	0.00< 59.57	0.0	

C46	PD	*	0.00000<	0.00230	0.00000<	0.04170	0.00<	0.00	0.0
C47	AG	*	0.00000<	0.00230	0.00000<	0.04170	0.00<	0.00	0.0
C48	CD	*	0.00000<	0.00250	0.00000<	0.04170	0.00<	0.00	0.0
C49	IN	*	0.00000<	0.00260	0.00000<	0.04170	0.00<	0.00	0.0
C50	SN	*	0.00000<	0.00330	0.00000<	0.04170	0.00<	0.00	0.0
C51	SB	*	0.00170<	0.00370	0.00000<	0.04170	0.00<	24.53	0.0
C56	BA	*	0.00430+-	0.00180	0.00000+-	0.04175	0.00+-	9.71	-0.1
C57	LA	*	0.00160+-	0.00160	0.00000+-	0.04177	0.00+-	26.11	0.0
C80	HG	*	0.00330+-	0.00120	0.00000+-	0.04170	0.00+-	12.64	-0.1
C82	PB	*	0.00020<	0.00130	0.00000<	0.04170	0.00<	*****	0.0
C200	TC		3.96500+-	0.34810	3.64989+-	0.88709	0.92+-	0.24	-0.3
C201	OC	*	3.77030+-	0.28860	2.85101+-	0.81958	0.76+-	0.22	-1.1
C202	EC	*	0.19180+-	0.10940	0.79887+-	0.34199	4.17+-	2.97	1.7
C203	SO4		0.54100+-	0.02700	0.01149+-	0.04279	0.02+-	0.08	-10.5
C204	NO3	*	0.68250+-	0.03420	0.69343+-	0.05435	1.02+-	0.09	0.2
C205	NH4	*	0.22350+-	0.01120	0.20282+-	0.04627	0.91+-	0.21	-0.4
C217	CL2		0.00000<	0.06240	0.00009<	0.04170	0.00<	0.00	0.0
C219	K2		0.00000<	0.06240	0.01271<	0.04319	0.00<	0.00	0.2
C300	F2		0.08240+-	0.00410	0.00000+-	0.00053	0.00+-	0.01	-19.9
C301	NA2		0.55760+-	0.02790	0.00000+-	0.00053	0.00+-	0.00	-20.0
C302	CA2		0.33420+-	0.01670	0.00000+-	0.00053	0.00+-	0.00	-20.0
C303	MG2		0.03610+-	0.00180	0.00000+-	0.00053	0.00+-	0.01	-19.3
C304	NA	*	0.02360+-	0.01350	0.00000+-	0.00053	0.00+-	0.02	-1.7
C305	CO	*	0.00000<	0.00130	0.00000<	0.00010	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/20/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 12/14/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.99	% MASS	101.5
CHI SQUARE	0.09	DEGREES FREEDOM	36

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.18577	0.02448	7.58723
YES HAML13	NH4NO3F2	0.26444	0.03032	8.72065
YES HAML54	RWC_F222	5.15184	0.62379	8.25887
YES HAML75	SOILDUST	0.08210	0.03635	2.25900

5.68415

MEASURED CONCENTRATION FOR SIZE: FINE

5.6+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 4 FOR MAX. UNC. = 1.12000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.02434 0.03032 0.03634 0.62380

NUMBER ESTIMABLE SOURCES = 4 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML54 1.0000 HAML75

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES

COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	SCE	Std
Err					

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		RESIDUAL	UNCERTAINTY
			CALCULATED	MEASURED		
TMAC	TMAU	5.60000+- 0.00010	5.68415+- 0.62259	1.02+- 0.11	0.1	
C12	MG	* 0.00680+- 0.00510	0.00164+- 0.01859	0.24+- 2.74	-0.3	
C13	AL	* 0.01060+- 0.00360	0.01504+- 0.01860	1.42+- 1.82	0.2	
C14	SI	* 0.04280+- 0.00330	0.04195+- 0.01865	0.98+- 0.44	0.0	
C15	P	* 0.00000< 0.00090	0.00038< 0.01858	0.00< 0.00	0.0	
C16	S	* 0.06940+- 0.00530	0.06940+- 0.00613	1.00+- 0.12	0.0	
C17	CL	0.00740+- 0.00190	0.00956+- 0.01858	1.29+- 2.53	0.1	
C19	K	* 0.04560+- 0.00290	0.01991+- 0.01858	0.44+- 0.41	-1.4	
C20	CA	* 0.00000< 0.00140	0.00799< 0.01858	0.00< 0.00	0.4	
C22	TI	* 0.00160+- 0.00040	0.00087+- 0.01858	0.54+-11.61	0.0	
C23	V	* 0.00000< 0.00030	0.00006< 0.01858	0.00< 0.00	0.0	
C24	CR	* 0.00000< 0.00040	0.00004< 0.01858	0.00< 0.00	0.0	
C25	MN	* 0.00080+- 0.00050	0.00053+- 0.01858	0.66+-23.23	0.0	
C26	FE	* 0.00660+- 0.00090	0.00755+- 0.01858	1.14+- 2.82	0.1	
C28	NI	* 0.00120+- 0.00060	0.00001+- 0.01858	0.00+-15.48	-0.1	
C29	CU	* 0.00050< 0.00060	0.00004< 0.01858	0.08< 37.15	0.0	
C30	ZN	* 0.00270+- 0.00060	0.00149+- 0.01858	0.55+- 6.88	-0.1	
C31	GA	* 0.00000< 0.00040	0.00000< 0.01858	0.00< 0.00	0.0	
C32	GE	* 0.00030< 0.00040	0.00000< 0.01858	0.00< 61.92	0.0	
C33	AS	* 0.00000< 0.00050	0.00000< 0.01858	0.00< 0.00	0.0	
C34	SE	* 0.00020< 0.00030	0.00003< 0.01858	0.15< 92.89	0.0	
C35	BR	0.00090+- 0.00030	0.00010+- 0.01858	0.11+-20.64	0.0	
C37	RB	* 0.00020< 0.00030	0.00009< 0.01858	0.44< 92.89	0.0	
C38	SR	* 0.00000< 0.00030	0.00022< 0.01858	0.00< 0.00	0.0	
C39	Y	* 0.00000< 0.00040	0.00000< 0.01858	0.00< 0.00	0.0	
C40	ZR	* 0.00020< 0.00050	0.00026< 0.01858	1.29< 92.95	0.0	

C42	MO	*	0.00010<	0.00080	0.00000<	0.01858	0.00<*****	0.0
C46	PD	*	0.00140<	0.00260	0.00000<	0.01858	0.00< 13.27	-0.1
C47	AG	*	0.00260<	0.00270	0.00000<	0.01858	0.00< 7.15	-0.1
C48	CD	*	0.00050<	0.00290	0.00000<	0.01858	0.00< 37.16	0.0
C49	IN	*	0.00000<	0.00310	0.00000<	0.01858	0.00< 0.00	0.0
C50	SN	*	0.00750+-	0.00350	0.00000+-	0.01858	0.00+- 2.48	-0.4
C51	SB	*	0.00000<	0.00360	0.00036<	0.01858	0.00< 0.00	0.0
C56	BA	*	0.00320+-	0.00130	0.00133+-	0.01862	0.42+- 5.82	-0.1
C57	LA	*	0.00030<	0.00080	0.00000<	0.01858	0.00< 61.92	0.0
C80	HG	*	0.00030<	0.00070	0.00005<	0.01858	0.15< 61.93	0.0
C82	PB	*	0.00110+-	0.00080	0.00058+-	0.01858	0.52+-16.89	0.0
C200	TC	4.26130+-	0.36300	4.34300+-	0.41806	1.02+- 0.13	0.1	
C201	OC	*	4.12980+-	0.30610	4.17299+-	0.41771	1.01+- 0.13	0.1
C202	EC	*	0.13330+-	0.10640	0.17001+-	0.02518	1.28+- 1.04	0.3
C203	SO4	0.33580+-	0.01680	0.00000+-	0.01858	0.00+- 0.06	-13.4	
C204	NO3	*	0.20720+-	0.01040	0.20494+-	0.02122	0.99+- 0.11	-0.1
C205	NH4	*	0.00000<	0.06240	0.05950<	0.01951	0.00< 0.00	0.9
C217	CL2	0.07240+-	0.00360	0.00000+-	0.01858	0.00+- 0.26	-3.8	
C219	K2	0.00000<	0.06240	0.00000<	0.01858	0.00< 0.00	0.0	
C300	F2	0.09240+-	0.00460	0.00000+-	0.00052	0.00+- 0.01	-20.0	
C301	NA2	2.46770+-	0.12320	0.00000+-	0.00052	0.00+- 0.00	-20.0	
C302	CA2	0.46610+-	0.02320	0.00000+-	0.00052	0.00+- 0.00	-20.1	
C303	MG2	0.06870+-	0.00350	0.00000+-	0.00052	0.00+- 0.01	-19.4	
C304	NA	*	0.00000<	0.02670	0.00082<	0.00054	0.00< 0.00	0.0
C305	CO	*	0.00000<	0.00120	0.00000<	0.00052	0.00< 0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/23/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 12/26/07 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.98	% MASS	103.7
CHI SQUARE	0.07	DEGREES FREEDOM	35

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11 S04_FZER		0.10038	0.01541	6.51537
YES HAML13 NH4NO3F2		0.10127	0.01477	6.85474
YES HAML54 RWC_F222		1.66455	0.26478	6.28664

1.86621

MEASURED CONCENTRATION FOR SIZE: FINE
1.8+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 0.36000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.01477 0.01537 0.26478

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML54

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	1.80000+- 0.00010	1.86621+- 0.26450	1.04+- 0.15	0.3	
C12	MG	* 0.00000< 0.00500	0.00000< 0.01004	0.00< 0.00	0.0	
C13	AL	* 0.00650+- 0.00340	0.00008+- 0.01004	0.01+- 1.54	-0.6	
C14	SI	0.02090+- 0.00230	0.00082+- 0.01004	0.04+- 0.48	-1.9	
C15	P	* 0.00000< 0.00080	0.00012< 0.01004	0.00< 0.00	0.0	
C16	S	* 0.03580+- 0.00390	0.03580+- 0.00331	1.00+- 0.14	0.0	
C17	CL	0.00950+- 0.00220	0.00309+- 0.01004	0.33+- 1.06	-0.6	
C19	K	0.01040+- 0.00140	0.00590+- 0.01004	0.57+- 0.97	-0.4	
C20	CA	* 0.00180+- 0.00070	0.00211+- 0.01004	1.17+- 5.60	0.0	
C22	TI	* 0.00100+- 0.00040	0.00008+- 0.01004	0.08+-10.04	-0.1	
C23	V	* 0.00020< 0.00030	0.00001< 0.01004	0.05< 50.19	0.0	
C24	CR	* 0.00020< 0.00040	0.00001< 0.01004	0.04< 50.19	0.0	
C25	MN	* 0.00000< 0.00060	0.00010< 0.01004	0.00< 0.00	0.0	
C26	FE	* 0.00290+- 0.00090	0.00018+- 0.01004	0.06+- 3.46	-0.3	
C28	NI	* 0.00020< 0.00070	0.00000< 0.01004	0.01< 50.19	0.0	
C29	CU	* 0.00000< 0.00070	0.00000< 0.01004	0.00< 0.00	0.0	
C30	ZN	* 0.00060+- 0.00050	0.00048+- 0.01004	0.80+-16.74	0.0	
C31	GA	* 0.00100+- 0.00040	0.00000+- 0.01004	0.00+-10.04	-0.1	
C32	GE	* 0.00050+- 0.00040	0.00000+- 0.01004	0.00+-20.08	0.0	
C33	AS	* 0.00000< 0.00060	0.00000< 0.01004	0.00< 0.00	0.0	
C34	SE	* 0.00000< 0.00030	0.00001< 0.01004	0.00< 0.00	0.0	
C35	BR	0.00020< 0.00030	0.00003< 0.01004	0.16< 50.19	0.0	
C37	RB	* 0.00020< 0.00030	0.00003< 0.01004	0.14< 50.19	0.0	
C38	SR	* 0.00000< 0.00040	0.00007< 0.01004	0.00< 0.00	0.0	
C39	Y	* 0.00050+- 0.00050	0.00000+- 0.01004	0.00+-20.08	0.0	
C40	ZR	* 0.00000< 0.00060	0.00008< 0.01004	0.00< 0.00	0.0	
C42	MO	* 0.00000< 0.00080	0.00000< 0.01004	0.00< 0.00	0.0	

C46	PD	*	0.00000<	0.00260	0.00000<	0.01004	0.00<	0.00	0.0
C47	AG	*	0.00060<	0.00280	0.00000<	0.01004	0.00<	16.73	-0.1
C48	CD	*	0.00000<	0.00310	0.00000<	0.01004	0.00<	0.00	0.0
C49	IN	*	0.00000<	0.00320	0.00000<	0.01004	0.00<	0.00	0.0
C50	SN	*	0.00000<	0.00350	0.00000<	0.01004	0.00<	0.00	0.0
C51	SB	*	0.00000<	0.00380	0.00012<	0.01004	0.00<	0.00	0.0
C56	BA	*	0.00050<	0.00140	0.00043<	0.01005	0.86<	20.24	0.0
C57	LA	*	0.00040<	0.00090	0.00000<	0.01004	0.00<	25.10	0.0
C80	HG	*	0.00080+-	0.00070	0.00001+-	0.01004	0.02+-	12.55	-0.1
C82	PB	*	0.00150+-	0.00090	0.00016+-	0.01004	0.11+-	6.69	-0.1
C200	TC		1.42820+-	0.22120	1.40322+-	0.13531	0.98+-	0.18	-0.1
C201	OC	*	1.34330+-	0.16730	1.34829+-	0.13520	1.00+-	0.16	0.0
C202	EC	*	0.08240<	0.10390	0.05493<	0.01144	0.67<	0.85	-0.3
C203	SO4		0.17350+-	0.00870	0.00000+-	0.01004	0.00+-	0.06	-13.1
C204	NO3	*	0.07870+-	0.00390	0.07848+-	0.01078	1.00+-	0.15	0.0
C205	NH4	*	0.00000<	0.06240	0.02279<	0.01029	0.00<	0.00	0.4
C217	CL2		0.06370+-	0.00320	0.00000+-	0.01004	0.00+-	0.16	-6.0
C219	K2		0.00000<	0.06240	0.00000<	0.01004	0.00<	0.00	0.0
C300	F2		0.08990+-	0.00450	0.00000+-	0.00017	0.00+-	0.00	-20.0
C301	NA2		0.50350+-	0.02520	0.00000+-	0.00017	0.00+-	0.00	-20.0
C302	CA2		0.36290+-	0.01810	0.00000+-	0.00017	0.00+-	0.00	-20.0
C303	MG2		0.03830+-	0.00190	0.00000+-	0.00017	0.00+-	0.00	-20.1
C304	NA	*	0.03560+-	0.02760	0.00000+-	0.00017	0.00+-	0.00	-1.3
C305	CO	*	0.00030<	0.00140	0.00000<	0.00017	0.00<	0.56	-0.2

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/23/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 1/7/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1

Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.98	% MASS	106.6
CHI SQUARE	0.18	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.10426	0.01716	6.07458
YES HAML13	NH4NO3F2	1.00375	0.06217	16.14478
YES HAML54	RWC_F222	7.84756	0.85730	9.15384

8.95557

MEASURED CONCENTRATION FOR SIZE: FINE

8.4+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 1.68000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.01677 0.06217 0.85731

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML54

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	8.40000+- 0.00010	8.95557+- 0.85605	1.07+- 0.10	0.6	
C12	MG	* 0.00020< 0.00550	0.00000< 0.01043	0.00< 52.13	0.0	
C13	AL	* 0.00080< 0.00260	0.00040< 0.01043	0.50< 13.14	0.0	
C14	SI	* 0.01680+- 0.00220	0.00387+- 0.01043	0.23+- 0.62	-1.2	
C15	P	* 0.00000< 0.00090	0.00058< 0.01044	0.00< 0.00	0.1	
C16	S	* 0.04590+- 0.00440	0.04590+- 0.00345	1.00+- 0.12	0.0	
C17	CL	0.02350+- 0.00270	0.01457+- 0.01044	0.62+- 0.45	-0.8	
C19	K	* 0.03840+- 0.00250	0.02783+- 0.01044	0.72+- 0.28	-1.0	
C20	CA	* 0.00830+- 0.00090	0.00993+- 0.01043	1.20+- 1.26	0.2	
C22	TI	* 0.00120+- 0.00040	0.00037+- 0.01044	0.31+- 8.70	-0.1	
C23	V	* 0.00000< 0.00030	0.00005< 0.01043	0.00< 0.00	0.0	
C24	CR	* 0.00050+- 0.00050	0.00004+- 0.01043	0.08+-20.85	0.0	
C25	MN	* 0.00030< 0.00060	0.00046< 0.01043	1.52< 34.88	0.0	
C26	FE	* 0.00740+- 0.00110	0.00087+- 0.01043	0.12+- 1.41	-0.6	
C28	NI	* 0.00220+- 0.00070	0.00001+- 0.01043	0.00+- 4.74	-0.2	
C29	CU	* 0.00040< 0.00070	0.00000< 0.01043	0.00< 26.06	0.0	
C30	ZN	* 0.00730+- 0.00080	0.00227+- 0.01043	0.31+- 1.43	-0.5	
C31	GA	* 0.00070+- 0.00050	0.00000+- 0.01043	0.00+-14.89	-0.1	
C32	GE	* 0.00030< 0.00040	0.00000< 0.01043	0.00< 34.75	0.0	
C33	AS	* 0.00000< 0.00060	0.00000< 0.01043	0.00< 0.00	0.0	
C34	SE	* 0.00000< 0.00030	0.00005< 0.01043	0.00< 0.00	0.0	
C35	BR	0.00140+- 0.00030	0.00015+- 0.01043	0.11+- 7.45	-0.1	
C37	RB	* 0.00000< 0.00030	0.00013< 0.01043	0.00< 0.00	0.0	
C38	SR	* 0.00010< 0.00040	0.00033< 0.01043	3.30< ****	0.0	
C39	Y	* 0.00000< 0.00050	0.00000< 0.01043	0.00< 0.00	0.0	
C40	ZR	* 0.00000< 0.00060	0.00039< 0.01043	0.00< 0.00	0.0	
C42	MO	* 0.00000< 0.00090	0.00000< 0.01043	0.00< 0.00	0.0	

C46	PD	*	0.00000<	0.00270	0.00000<	0.01043	0.00<	0.00	0.0
C47	AG	*	0.00110<	0.00290	0.00000<	0.01043	0.00<	9.48	-0.1
C48	CD	*	0.00290<	0.00310	0.00000<	0.01044	0.00<	3.60	-0.3
C49	IN	*	0.00160<	0.00330	0.00000<	0.01043	0.00<	6.52	-0.1
C50	SN	*	0.00000<	0.00370	0.00000<	0.01043	0.00<	0.00	0.0
C51	SB	*	0.00000<	0.00390	0.00055<	0.01045	0.00<	0.00	0.0
C56	BA	*	0.00230+-	0.00160	0.00202+-	0.01062	0.88+-	4.66	0.0
C57	LA	*	0.00170+-	0.00100	0.00000+-	0.01043	0.00+-	6.13	-0.2
C80	HG	*	0.00130+-	0.00080	0.00007+-	0.01043	0.05+-	8.02	-0.1
C82	PB	*	0.00140+-	0.00100	0.00078+-	0.01043	0.55+-	7.46	-0.1
C200	TC		6.24220+-	0.46280	6.61550+-	0.63626	1.06+-	0.13	0.5
C201	OC	*	5.79280+-	0.39000	6.35653+-	0.63574	1.10+-	0.13	0.8
C202	EC	*	0.46480+-	0.12330	0.25897+-	0.02792	0.56+-	0.16	-1.6
C203	SO4		0.19850+-	0.00990	0.00000+-	0.01043	0.00+-	0.05	-13.8
C204	NO3	*	0.78240+-	0.03910	0.77790+-	0.04032	0.99+-	0.07	-0.1
C205	NH4	*	0.22220+-	0.01110	0.22584+-	0.02488	1.02+-	0.12	0.1
C217	CL2		0.07370+-	0.00370	0.00000+-	0.01043	0.00+-	0.14	-6.7
C219	K2		0.00000<	0.06240	0.00000<	0.01043	0.00<	0.00	0.0
C300	F2		0.07870+-	0.00390	0.00000+-	0.00079	0.00+-	0.01	-19.8
C301	NA2		0.32830+-	0.01640	0.00000+-	0.00079	0.00+-	0.00	-20.0
C302	CA2		0.18560+-	0.00930	0.00000+-	0.00079	0.00+-	0.00	-19.9
C303	MG2		0.02160+-	0.00110	0.00000+-	0.00079	0.00+-	0.04	-15.9
C304	NA	*	0.00020<	0.02820	0.00000<	0.00079	0.00<	3.96	0.0
C305	CO	*	0.00000<	0.00150	0.00000<	0.00079	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 1/13/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.89	% MASS	96.6
CHI SQUARE	1.24	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.13526	0.01970	6.86535
YES HAML13	NH4NO3F2	0.93618	0.06065	15.43584
YES HAML63	RSWDBRN4	4.63042	0.47747	9.69785

5.70186

MEASURED CONCENTRATION FOR SIZE: FINE
5.9+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 1.18000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.01968 0.06065 0.47747

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

 1.0000 HAML11 1.0000 HAML13 1.0000 HAML63

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

 ======

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	5.90000+- 0.00010	5.70186+- 0.48015	0.97+- 0.08	-0.4	
C12	MG	* 0.00000< 0.00490	0.00000< 0.01353	0.00< 0.00	0.0	
C13	AL	* 0.00120< 0.00260	0.00017< 0.01353	0.14< 11.28	-0.1	
C14	SI	* 0.01160+- 0.00230	0.00064+- 0.01353	0.06+- 1.17	-0.8	
C15	P	* 0.00000< 0.00100	0.00000< 0.01353	0.00< 0.00	0.0	
C16	S	* 0.04780+- 0.00480	0.04780+- 0.00446	1.00+- 0.14	0.0	
C17	CL	0.01630+- 0.00210	0.00609+- 0.01353	0.37+- 0.83	-0.7	
C19	K	* 0.03680+- 0.00240	0.00483+- 0.01353	0.13+- 0.37	-2.3	
C20	CA	* 0.00760+- 0.00080	0.00062+- 0.01353	0.08+- 1.78	-0.5	
C22	TI	* 0.00080+- 0.00040	0.00000+- 0.01353	0.00+- 16.91	-0.1	
C23	V	* 0.00100+- 0.00030	0.00001+- 0.01353	0.01+- 13.53	-0.1	
C24	CR	* 0.00050+- 0.00040	0.00000+- 0.01353	0.00+- 27.05	0.0	
C25	MN	* 0.00130+- 0.00060	0.00001+- 0.01353	0.01+- 10.40	-0.1	
C26	FE	* 0.00290+- 0.00080	0.00006+- 0.01353	0.02+- 4.66	-0.2	
C28	NI	* 0.00190+- 0.00100	0.00000+- 0.01353	0.00+- 7.12	-0.1	
C29	CU	* 0.00060< 0.00080	0.00000< 0.01353	0.00< 22.54	0.0	
C30	ZN	* 0.00370+- 0.00090	0.00049+- 0.01353	0.13+- 3.66	-0.2	
C31	GA	* 0.00030< 0.00060	0.00000< 0.01353	0.00< 45.09	0.0	
C32	GE	* 0.00040< 0.00050	0.00000< 0.01353	0.00< 33.83	0.0	
C33	AS	* 0.00000< 0.00040	0.00001< 0.01353	0.00< 0.00	0.0	
C34	SE	* 0.00070+- 0.00040	0.00000+- 0.01353	0.01+- 19.32	-0.1	
C35	BR	0.00050+- 0.00040	0.00005+- 0.01353	0.10+- 27.05	0.0	
C37	RB	* 0.00010< 0.00050	0.00000< 0.01353	0.00< *****	0.0	
C38	SR	* 0.00020< 0.00060	0.00000< 0.01353	0.02< 67.63	0.0	
C39	Y	* 0.00000< 0.00080	0.00000< 0.01353	0.00< 0.00	0.0	
C40	ZR	* 0.00110+- 0.00100	0.00000+- 0.01353	0.00+- 12.30	-0.1	
C42	MO	* 0.00000< 0.00140	0.00000< 0.01353	0.00< 0.00	0.0	

C46	PD	*	0.00000<	0.00230	0.00000<	0.01353	0.00<	0.00	0.0
C47	AG	*	0.00190<	0.00230	0.00002<	0.01353	0.01<	7.12	-0.1
C48	CD	*	0.00000<	0.00240	0.00006<	0.01353	0.00<	0.00	0.0
C49	IN	*	0.00000<	0.00260	0.00000<	0.01353	0.00<	0.00	0.0
C50	SN	*	0.00000<	0.00320	0.00000<	0.01353	0.00<	0.00	0.0
C51	SB	*	0.00000<	0.00350	0.00005<	0.01353	0.00<	0.00	0.0
C56	BA	*	0.00060<	0.00170	0.00036<	0.01357	0.59<	22.68	0.0
C57	LA	*	0.00280+-	0.00150	0.00037+-	0.01359	0.13+-	4.85	-0.2
C80	HG	*	0.00030<	0.00110	0.00000<	0.01353	0.00<	45.09	0.0
C82	PB	*	0.00220+-	0.00120	0.00000+-	0.01353	0.00+-	6.15	-0.2
C200	TC		4.71910+-	0.38600	3.77285+-	0.24185	0.80+-	0.08	-2.1
C201	OC	*	4.55260+-	0.32760	3.05665+-	0.23798	0.67+-	0.07	-3.7
C202	EC	*	0.16730+-	0.10840	0.71620+-	0.04521	4.28+-	2.79	4.7
C203	SO4		0.23970+-	0.01200	0.00650+-	0.01356	0.03+-	0.06	-12.9
C204	NO3	*	0.77400+-	0.03870	0.72718+-	0.03876	0.94+-	0.07	-0.9
C205	NH4	*	0.17730+-	0.00890	0.21526+-	0.02504	1.21+-	0.15	1.4
C217	CL2		0.21970+-	0.01100	0.00006+-	0.01353	0.00+-	0.06	-12.6
C219	K2		0.22850+-	0.01140	0.00358+-	0.01353	0.02+-	0.06	-12.7
C300	F2		0.14110+-	0.00710	0.00000+-	0.00047	0.00+-	0.00	-19.8
C301	NA2		0.56180+-	0.02810	0.00000+-	0.00047	0.00+-	0.00	-20.0
C302	CA2		0.29590+-	0.01480	0.00000+-	0.00047	0.00+-	0.00	-20.0
C303	MG2		0.03570+-	0.00180	0.00000+-	0.00047	0.00+-	0.01	-19.2
C304	NA	*	0.01300+-	0.01270	0.00000+-	0.00047	0.00+-	0.04	-1.0
C305	CO	*	0.00000<	0.00120	0.00001<	0.00010	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 1/19/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1

Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.98	% MASS	99.7
CHI SQUARE	0.22	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE	EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11 S04_FZER			0.34457	0.04097	8.41142
YES HAML13 NH4NO3F2			1.17797	0.08484	13.88408
YES HAML54 RWC_F222			4.46085	0.55855	7.98643

5.98339

MEASURED CONCENTRATION FOR SIZE: FINE

6.0+- 0.0

Eligible Space Collinearity Display

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=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 1.20000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.04089 0.08484 0.55856

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML54

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	6.00000+- 0.00010	5.98339+- 0.56408	1.00+- 0.09	0.0	
C12	MG	* 0.00930+- 0.00540	0.00000+- 0.03446	0.00+- 3.71	-0.3	
C13	AL	* 0.00760+- 0.00410	0.00023+- 0.03446	0.03+- 4.53	-0.2	
C14	SI	* 0.01750+- 0.00260	0.00220+- 0.03446	0.13+- 1.97	-0.4	
C15	P	* 0.00040< 0.00110	0.00033< 0.03446	0.83< 86.18	0.0	
C16	S	* 0.12110+- 0.00750	0.12110+- 0.01137	1.00+- 0.11	0.0	
C17	CL	0.01190+- 0.00220	0.00828+- 0.03446	0.70+- 2.90	-0.1	
C19	K	* 0.04650+- 0.00290	0.01582+- 0.03446	0.34+- 0.74	-0.9	
C20	CA	* 0.00910+- 0.00140	0.00564+- 0.03446	0.62+- 3.79	-0.1	
C22	TI	* 0.00140+- 0.00040	0.00021+- 0.03446	0.15+-24.61	0.0	
C23	V	* 0.00000< 0.00030	0.00003< 0.03446	0.00< 0.00	0.0	
C24	CR	* 0.00000< 0.00040	0.00002< 0.03446	0.00< 0.00	0.0	
C25	MN	* 0.00050< 0.00060	0.00026< 0.03446	0.52< 68.92	0.0	
C26	FE	* 0.01600+- 0.00660	0.00050+- 0.03446	0.03+- 2.15	-0.4	
C28	NI	* 0.00160+- 0.00100	0.00000+- 0.03446	0.00+-21.54	0.0	
C29	CU	* 0.00070< 0.00080	0.00000< 0.03446	0.00< 49.22	0.0	
C30	ZN	* 0.00550+- 0.00090	0.00129+- 0.03446	0.23+- 6.27	-0.1	
C31	GA	* 0.00090+- 0.00050	0.00000+- 0.03446	0.00+-38.29	0.0	
C32	GE	* 0.00150+- 0.00050	0.00000+- 0.03446	0.00+-22.97	0.0	
C33	AS	* 0.00000< 0.00050	0.00000< 0.03446	0.00< 0.00	0.0	
C34	SE	* 0.00100+- 0.00040	0.00003+- 0.03446	0.03+-34.46	0.0	
C35	BR	0.00180+- 0.00040	0.00008+- 0.03446	0.05+-19.14	0.0	
C37	RB	* 0.00000< 0.00050	0.00008< 0.03446	0.00< 0.00	0.0	
C38	SR	* 0.00000< 0.00060	0.00019< 0.03446	0.00< 0.00	0.0	
C39	Y	* 0.00080+- 0.00080	0.00000+- 0.03446	0.00+-43.07	0.0	
C40	ZR	* 0.00160+- 0.00100	0.00022+- 0.03446	0.14+-21.54	0.0	
C42	MO	* 0.00080< 0.00140	0.00000< 0.03446	0.00< 43.07	0.0	

C46	PD	*	0.00000<	0.00230	0.00000<	0.03446	0.00<	0.00	0.0
C47	AG	*	0.00000<	0.00240	0.00000<	0.03446	0.00<	0.00	0.0
C48	CD	*	0.00200<	0.00250	0.00000<	0.03446	0.00<	17.23	-0.1
C49	IN	*	0.00000<	0.00260	0.00000<	0.03446	0.00<	0.00	0.0
C50	SN	*	0.00040<	0.00330	0.00000<	0.03446	0.00<	86.14	0.0
C51	SB	*	0.00000<	0.00350	0.00031<	0.03446	0.00<	0.00	0.0
C56	BA	*	0.00000<	0.00170	0.00115<	0.03448	0.00<	0.00	0.0
C57	LA	*	0.00000<	0.00150	0.00000<	0.03446	0.00<	0.00	0.0
C80	HG	*	0.00240+-	0.00110	0.00004+-	0.03446	0.02+-	14.36	-0.1
C82	PB	*	0.00280+-	0.00120	0.00044+-	0.03446	0.16+-	12.31	-0.1
C200	TC	3.74530+-	0.33710	3.76050+-	0.36327	1.00+-	0.13	0.0	
C201	OC	*	3.56050+-	0.27770	3.61329+-	0.36297	1.01+-	0.13	0.1
C202	EC	*	0.18730+-	0.10940	0.14721+-	0.03747	0.79+-	0.50	-0.3
C203	SO4	0.46610+-	0.02330	0.00000+-	0.03446	0.00+-	0.07	-11.2	
C204	NO3	*	0.88640+-	0.04410	0.91292+-	0.05724	1.03+-	0.08	0.4
C205	NH4	*	0.30210+-	0.01510	0.26504+-	0.04348	0.88+-	0.15	-0.8
C217	CL2	0.06870+-	0.00340	0.00000+-	0.03446	0.00+-	0.50	-2.0	
C219	K2	0.00000<	0.06240	0.00000<	0.03446	0.00<	0.00	0.0	
C300	F2	0.07240+-	0.00360	0.00000+-	0.00046	0.00+-	0.01	-19.9	
C301	NA2	0.41450+-	0.02070	0.00000+-	0.00046	0.00+-	0.00	-20.0	
C302	CA2	0.30550+-	0.01530	0.00000+-	0.00046	0.00+-	0.00	-20.0	
C303	MG2	0.03760+-	0.00190	0.00000+-	0.00046	0.00+-	0.01	-19.2	
C304	NA	*	0.07950+-	0.03280	0.00000+-	0.00046	0.00+-	0.01	-2.4
C305	CO	*	0.00000<	0.00120	0.00000<	0.00046	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/29/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 1/25/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.97	% MASS	100.5
CHI SQUARE	0.53	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.51009	0.06252	8.15845
YES HAML13	NH4NO3F2	16.25178	0.97250	16.71136
YES HAML71	RWCSFTCP	26.56553	1.40658	18.88661

43.32740

MEASURED CONCENTRATION FOR SIZE: FINE
43.1+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 8.62000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.06224 0.97248 1.40661

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML71

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	43.10000+- 0.00010	43.32740+- 1.70266	1.01+- 0.04	0.1	
C12	MG	* 0.00000< 0.00670	0.00482< 0.05108	0.00< 0.00	0.1	
C13	AL	* 0.01620+- 0.00540	0.00329+- 0.05108	0.20+- 3.15	-0.3	
C14	SI	* 0.05290+- 0.00460	0.00903+- 0.05108	0.17+- 0.97	-0.9	
C15	P	* 0.00270+- 0.00130	0.00066+- 0.05108	0.25+-18.92	0.0	
C16	S	* 0.20700+- 0.01180	0.20700+- 0.01704	1.00+- 0.10	0.0	
C17	CL	0.09130+- 0.00570	0.03411+- 0.05108	0.37+- 0.56	-1.1	
C19	K	* 0.13340+- 0.00720	0.18650+- 0.05108	1.40+- 0.39	1.0	
C20	CA	* 0.02010+- 0.00150	0.00452+- 0.05108	0.22+- 2.54	-0.3	
C22	TI	* 0.00000< 0.00050	0.00000< 0.05108	0.00< 0.00	0.0	
C23	V	* 0.00000< 0.00030	0.00000< 0.05108	0.00< 0.00	0.0	
C24	CR	* 0.00000< 0.00040	0.00000< 0.05108	0.00< 0.00	0.0	
C25	MN	* 0.00000< 0.00060	0.00000< 0.05108	0.00< 0.00	0.0	
C26	FE	* 0.01950+- 0.00130	0.00239+- 0.05108	0.12+- 2.62	-0.3	
C28	NI	* 0.00140+- 0.00100	0.00000+- 0.05108	0.00+-36.48	0.0	
C29	CU	* 0.00290+- 0.00090	0.00011+- 0.05108	0.04+-17.61	-0.1	
C30	ZN	* 0.02150+- 0.00160	0.00794+- 0.05108	0.37+- 2.38	-0.3	
C31	GA	* 0.00000< 0.00050	0.00000< 0.05108	0.00< 0.00	0.0	
C32	GE	* 0.00000< 0.00050	0.00000< 0.05108	0.00< 0.00	0.0	
C33	AS	* 0.00020< 0.00080	0.00003< 0.05108	0.13< *****	0.0	
C34	SE	* 0.00000< 0.00040	0.00000< 0.05108	0.00< 0.00	0.0	
C35	BR	0.00210+- 0.00050	0.00064+- 0.05108	0.30+-24.32	0.0	
C37	RB	* 0.00020< 0.00050	0.00000< 0.05108	0.00< *****	0.0	
C38	SR	* 0.00000< 0.00060	0.00000< 0.05108	0.00< 0.00	0.0	
C39	Y	* 0.00010< 0.00080	0.00000< 0.05108	0.00< *****	0.0	
C40	ZR	* 0.00060< 0.00100	0.00000< 0.05108	0.00< 85.13	0.0	
C42	MO	* 0.00000< 0.00140	0.00000< 0.05108	0.00< 0.00	0.0	

C46	PD	*	0.00000<	0.00220	0.00005<	0.05108	0.00<	0.00	0.0
C47	AG	*	0.00000<	0.00230	0.00020<	0.05108	0.00<	0.00	0.0
C48	CD	*	0.00320+-	0.00240	0.00036+-	0.05108	0.11+-	15.96	-0.1
C49	IN	*	0.00000<	0.00260	0.00012<	0.05108	0.00<	0.00	0.0
C50	SN	*	0.00000<	0.00320	0.00031<	0.05108	0.00<	0.00	0.0
C51	SB	*	0.00000<	0.00350	0.00015<	0.05108	0.00<	0.00	0.0
C56	BA	*	0.00730+-	0.00170	0.00000+-	0.05108	0.00+-	7.00	-0.1
C57	LA	*	0.00200+-	0.00150	0.00118+-	0.05108	0.59+-	25.54	0.0
C80	HG	*	0.00000<	0.00110	0.00000<	0.05108	0.00<	0.00	0.0
C82	PB	*	0.00440+-	0.00130	0.00016+-	0.05108	0.04+-	11.61	-0.1
C200	TC	17.42820+-	1.01870	0.00000+-	0.05108	0.00+-	0.00	-17.1	
C201	OC	*	16.27970+-	0.91390	14.03147+-	0.05108	0.86+-	0.05	-2.5
C202	EC	*	1.16350+-	0.15830	1.72128+-	0.05108	1.48+-	0.21	3.4
C203	SO4	0.78240+-	0.03920	0.04904+-	0.05108	0.06+-	0.07	-11.4	
C204	NO3	*	12.44280+-	0.62010	12.62966+-	0.63263	1.02+-	0.07	0.2
C205	NH4	*	3.84100+-	0.19230	3.69877+-	0.36938	0.96+-	0.11	-0.3
C217	CL2	0.18730+-	0.00940	0.00000+-	0.05108	0.00+-	0.27	-3.6	
C219	K2	0.17350+-	0.00870	0.00000+-	0.05108	0.00+-	0.29	-3.3	
C300	F2	0.15480+-	0.00770	0.00000+-	0.00311	0.00+-	0.02	-18.6	
C301	NA2	0.42860+-	0.02140	0.00000+-	0.00311	0.00+-	0.01	-19.8	
C302	CA2	0.25970+-	0.01300	0.00000+-	0.00311	0.00+-	0.01	-19.4	
C303	MG2	0.02990+-	0.00150	0.00000+-	0.00311	0.00+-	0.10	-8.6	
C304	NA	*	0.03210+-	0.01950	0.02391+-	0.00311	0.74+-	0.46	-0.4
C305	CO	*	0.00000<	0.00120	0.00000<	0.00311	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 2/6/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.91	% MASS	114.1
CHI SQUARE	0.55	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11 S04_FZER		0.08703	0.01315	6.61767
YES HAML13 NH4NO3F2		0.16220	0.01611	10.06735
YES HAML64 RSWDBRN5		1.91887	0.25225	7.60691

2.16810

MEASURED CONCENTRATION FOR SIZE: FINE
1.9+- 0.0

Eligible Space Collinearity Display

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ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 0.38000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.01314 0.01611 0.25225

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

 1.0000 HAML11 1.0000 HAML13 1.0000 HAML64

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

=====

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	1.90000+- 0.00010	2.16810+- 0.25211	1.14+- 0.13	1.1	
C12	MG	* 0.00000< 0.00490	0.00000< 0.00871	0.00< 0.00	0.0	
C13	AL	* 0.00250+- 0.00250	0.00000+- 0.00870	0.00+- 3.48	-0.3	
C14	SI	* 0.01310+- 0.00230	0.00088+- 0.00870	0.07+- 0.66	-1.4	
C15	P	* 0.00000< 0.00090	0.00000< 0.00870	0.00< 0.00	0.0	
C16	S	* 0.03050+- 0.00330	0.03050+- 0.00287	1.00+- 0.14	0.0	
C17	CL	0.06990+- 0.00450	0.00204+- 0.00870	0.03+- 0.12	-6.9	
C19	K	* 0.01990+- 0.00170	0.00368+- 0.00870	0.18+- 0.44	-1.8	
C20	CA	* 0.00160+- 0.00120	0.00007+- 0.00870	0.04+- 5.44	-0.2	
C22	TI	* 0.00060+- 0.00040	0.00000+- 0.00870	0.00+-14.51	-0.1	
C23	V	* 0.00020< 0.00030	0.00000< 0.00870	0.00< 43.52	0.0	
C24	CR	* 0.00010< 0.00040	0.00000< 0.00870	0.00< 87.03	0.0	
C25	MN	* 0.00110+- 0.00060	0.00000+- 0.00870	0.00+- 7.91	-0.1	
C26	FE	* 0.00490+- 0.00090	0.00003+- 0.00870	0.01+- 1.78	-0.6	
C28	NI	* 0.00160+- 0.00100	0.00000+- 0.00870	0.00+- 5.44	-0.2	
C29	CU	* 0.00060< 0.00080	0.00000< 0.00870	0.00< 14.51	-0.1	
C30	ZN	* 0.00730+- 0.00100	0.00026+- 0.00870	0.04+- 1.19	-0.8	
C31	GA	* 0.00030< 0.00050	0.00000< 0.00870	0.00< 29.01	0.0	
C32	GE	* 0.00000< 0.00050	0.00000< 0.00871	0.00< 0.00	0.0	
C33	AS	* 0.00000< 0.00040	0.00000< 0.00870	0.00< 0.00	0.0	
C34	SE	* 0.00000< 0.00040	0.00000< 0.00870	0.00< 0.00	0.0	
C35	BR	* 0.00100+- 0.00040	0.00001+- 0.00870	0.01+- 8.70	-0.1	
C37	RB	* 0.00040< 0.00050	0.00001< 0.00870	0.01< 21.76	0.0	
C38	SR	* 0.00000< 0.00060	0.00000< 0.00870	0.00< 0.00	0.0	
C39	Y	* 0.00000< 0.00080	0.00000< 0.00870	0.00< 0.00	0.0	
C40	ZR	* 0.00140+- 0.00090	0.00000+- 0.00870	0.00+- 6.22	-0.2	
C42	MO	* 0.00040< 0.00140	0.00000< 0.00870	0.00< 21.76	0.0	

C46	PD	*	0.00000<	0.00220	0.00000<	0.00870	0.00<	0.00	0.0
C47	AG	*	0.00000<	0.00220	0.00001<	0.00870	0.00<	0.00	0.0
C48	CD	*	0.00210<	0.00240	0.00000<	0.00870	0.00<	4.14	-0.2
C49	IN	*	0.00000<	0.00260	0.00002<	0.00870	0.00<	0.00	0.0
C50	SN	*	0.00150<	0.00330	0.00004<	0.00870	0.03<	5.80	-0.2
C51	SB	*	0.00540+-	0.00350	0.00000+-	0.00870	0.00+-	1.61	-0.6
C56	BA		0.00000<	0.00160	0.00011<	0.00871	0.00<	0.00	0.0
C57	LA	*	0.00050<	0.00140	0.00011<	0.00871	0.22<	17.44	0.0
C80	HG	*	0.00000<	0.00110	0.00000<	0.00870	0.00<	0.00	0.0
C82	PB	*	0.00000<	0.00110	0.00000<	0.00870	0.00<	0.00	0.0
C200	TC		1.77200+-	0.23810	1.79796+-	0.10484	1.01+-	0.15	0.1
C201	OC	*	1.71710+-	0.18570	1.44472+-	0.10262	0.84+-	0.11	-1.3
C202	EC	*	0.05240<	0.10230	0.35324<	0.02318	6.74<	13.17	2.9
C203	SO4		0.20590+-	0.01030	0.00286+-	0.00871	0.01+-	0.04	-15.1
C204	NO3	*	0.12850+-	0.00640	0.12808+-	0.01074	1.00+-	0.10	0.0
C205	NH4	*	0.00000<	0.06240	0.03717<	0.00944	0.00<	0.00	0.6
C217	CL2		0.14230+-	0.00710	0.00002+-	0.00871	0.00+-	0.06	-12.7
C219	K2		0.06490+-	0.00320	0.00320+-	0.00870	0.05+-	0.13	-6.7
C300	F2		0.10230+-	0.00510	0.00000+-	0.00019	0.00+-	0.00	-20.0
C301	NA2		0.50750+-	0.02550	0.00000+-	0.00019	0.00+-	0.00	-19.9
C302	CA2		0.26120+-	0.01310	0.00000+-	0.00019	0.00+-	0.00	-19.9
C303	MG2		0.03690+-	0.00180	0.00000+-	0.00019	0.00+-	0.01	-20.4
C304	NA	*	0.02400+-	0.01340	0.00000+-	0.00019	0.00+-	0.01	-1.8
C305	CO	*	0.00000<	0.00120	0.00000<	0.00002	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 2/12/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.94	% MASS	104.6
CHI SQUARE	0.34	DEGREES FREEDOM	36

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML10	UNDST_HE	0.06293	0.03022	2.08252
YES HAML11	S04_FZER	0.11618	0.01602	7.25280
YES HAML13	NH4NO3F2	0.12322	0.01737	7.09237
YES HAML64	RSWDBRNS	2.20819	0.27295	8.09013

2.51052

MEASURED CONCENTRATION FOR SIZE: FINE

2.4+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 4 FOR MAX. UNC. = 0.48000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.01600 0.01737 0.03022 0.27295

NUMBER ESTIMABLE SOURCES = 4 FOR MIN. PROJ. = 0.95

PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML10 1.0000 HAML11 1.0000 HAML13 1.0000 HAML64

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES

COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
Err
=====

SPECIES CONCENTRATIONS:

CALCULATED RESIDUAL

SPECIES FIT MEASURED CALCULATED MEASURED UNCERTAINTY

TMAC TMAU 2.40000+- 0.00010 2.51052+- 0.27417 1.05+- 0.11 0.4
C12 MG * 0.00000< 0.00480 0.00000< 0.01162 0.00< 0.00 0.0
C13 AL * 0.01130+- 0.00410 0.00839+- 0.01165 0.74+- 1.07 -0.2
C14 SI * 0.02330+- 0.00280 0.02456+- 0.01185 1.05+- 0.52 0.1
C15 P * 0.00000< 0.00090 0.00014< 0.01162 0.00< 0.00 0.0
C16 S * 0.04070+- 0.00370 0.04070+- 0.00383 1.00+- 0.13 0.0
C17 CL 0.00000< 0.00160 0.00246< 0.01162 0.00< 0.00 0.2
C19 K * 0.01120+- 0.00130 0.00532+- 0.01162 0.48+- 1.04 -0.5
C20 CA * 0.00270+- 0.00120 0.00398+- 0.01162 1.47+- 4.36 0.1
C22 TI * 0.00000< 0.00050 0.00047< 0.01162 0.00< 0.00 0.0
C23 V * 0.00000< 0.00030 0.00003< 0.01162 0.00< 0.00 0.0
C24 CR * 0.00000< 0.00040 0.00001< 0.01162 0.00< 0.00 0.0
C25 MN * 0.00030< 0.00050 0.00003< 0.01162 0.10< 38.73 0.0
C26 FE * 0.00430+- 0.00080 0.00150+- 0.01162 0.35+- 2.70 -0.2
C28 NI * 0.00000< 0.00090 0.00000< 0.01162 0.00< 0.00 0.0
C29 CU * 0.00000< 0.00080 0.00001< 0.01162 0.00< 0.00 0.0
C30 ZN * 0.00040< 0.00080 0.00032< 0.01162 0.80< 29.09 0.0
C31 GA * 0.00010< 0.00050 0.00000< 0.01162 0.00< ***** 0.0
C32 GE * 0.00080+- 0.00050 0.00000+- 0.01162 0.00+-14.53 -0.1
C33 AS * 0.00000< 0.00070 0.00000< 0.01162 0.00< 0.00 0.0
C34 SE * 0.00020< 0.00040 0.00000< 0.01162 0.00< 58.09 0.0
C35 BR * 0.00140+- 0.00040 0.00002+- 0.01162 0.01+- 8.30 -0.1
C37 RB * 0.00040< 0.00050 0.00001< 0.01162 0.02< 29.05 0.0
C38 SR * 0.00000< 0.00060 0.00002< 0.01162 0.00< 0.00 0.0
C39 Y * 0.00000< 0.00070 0.00000< 0.01162 0.00< 0.00 0.0
C40 ZR * 0.00000< 0.00080 0.00000< 0.01162 0.00< 0.00 0.0

C42	MO	*	0.00000<	0.00130	0.00000<	0.01162	0.00<	0.00	0.0
C46	PD	*	0.00000<	0.00230	0.00003<	0.01162	0.00<	0.00	0.0
C47	AG	*	0.00130<	0.00220	0.00001<	0.01162	0.01<	8.94	-0.1
C48	CD	*	0.00310+-	0.00240	0.00000+-	0.01162	0.00+-	3.75	-0.3
C49	IN	*	0.00420+-	0.00250	0.00002+-	0.01162	0.00+-	2.77	-0.4
C50	SN	*	0.00340+-	0.00320	0.00004+-	0.01162	0.01+-	3.42	-0.3
C51	SB	*	0.00120<	0.00340	0.00002<	0.01162	0.02<	9.68	-0.1
C56	BA		0.00730+-	0.00150	0.00032+-	0.01163	0.04+-	1.59	-0.6
C57	LA	*	0.00110<	0.00130	0.00013<	0.01163	0.11<	10.57	-0.1
C80	HG	*	0.00190+-	0.00100	0.00000+-	0.01162	0.00+-	6.11	-0.2
C82	PB	*	0.00260+-	0.00100	0.00003+-	0.01162	0.01+-	4.47	-0.2
C200	TC		2.10240+-	0.25470	2.06904+-	0.12079	0.98+-	0.13	-0.1
C201	OC	*	2.00250+-	0.19980	1.66255+-	0.11824	0.83+-	0.10	-1.5
C202	EC	*	0.09840<	0.10490	0.40650<	0.02731	4.13<	4.41	2.8
C203	SO4		0.25470+-	0.01270	0.00330+-	0.01162	0.01+-	0.05	-14.6
C204	NO3	*	0.09860+-	0.00490	0.09823+-	0.01256	1.00+-	0.14	0.0
C205	NH4	*	0.00000<	0.06240	0.02850<	0.01195	0.00<	0.00	0.4
C217	CL2		0.00000<	0.06240	0.00002<	0.01162	0.00<	0.00	0.0
C219	K2		0.00000<	0.06240	0.00368<	0.01162	0.00<	0.00	0.1
C300	F2		0.07120+-	0.00360	0.00000+-	0.00022	0.00+-	0.00	-19.7
C301	NA2		0.47020+-	0.02350	0.00000+-	0.00022	0.00+-	0.00	-20.0
C302	CA2		0.26340+-	0.01320	0.00000+-	0.00022	0.00+-	0.00	-20.0
C303	MG2		0.02970+-	0.00150	0.00000+-	0.00022	0.00+-	0.01	-19.6
C304	NA	*	0.01080<	0.01150	0.00000<	0.00022	0.00<	0.02	-0.9
C305	CO	*	0.00000<	0.00110	0.00000<	0.00002	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 2/18/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.97	% MASS	105.0
CHI SQUARE	0.28	DEGREES FREEDOM	36

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.23809	0.04643	5.12762
YES HAML13	NH4NO3F2	0.77631	0.05702	13.61452
YES HAML66	RSWDBRN7	7.82711	1.55357	5.03814
YES HAML75	SOILDUST	0.39921	0.05273	7.57117

9.24073				

MEASURED CONCENTRATION FOR SIZE: FINE
8.8+- 0.0

Eligible Space Collinearity Display

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=====
ELIGIBLE SPACE DIM. = 4 FOR MAX. UNC. = 1.76000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.04567 0.05272 0.05696 1.55360

NUMBER ESTIMABLE SOURCES = 4 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML66 1.0000 HAML75

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES

COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	COEFF. SOURCE	SCE	Std
Err					

SPECIES CONCENTRATIONS:

		CALCULATED	RESIDUAL		
SPECIES	FIT	MEASURED	CALCULATED	MEASURED	UNCERTAINTY

TMAC	TMAU	8.80000+- 0.00010	9.24073+- 1.54407	1.05+- 0.18	0.3
C12	MG	* 0.02050+- 0.00990	0.00814+- 0.02397	0.40+- 1.19	-0.5
C13	AL	* 0.06800+- 0.00720	0.07283+- 0.02419	1.07+- 0.37	0.2
C14	SI	* 0.19330+- 0.01210	0.19355+- 0.02517	1.00+- 0.14	0.0
C15	P	* 0.00000< 0.00110	0.00010< 0.02381	0.00< 0.00	0.0
C16	S	* 0.09430+- 0.00800	0.09430+- 0.01299	1.00+- 0.16	0.0
C17	CL	0.01080+- 0.00210	0.01005+- 0.02481	0.93+- 2.30	0.0
C19	K	* 0.05700+- 0.00340	0.08110+- 0.09160	1.42+- 1.61	0.3
C20	CA	* 0.01430+- 0.00160	0.00960+- 0.02395	0.67+- 1.68	-0.2
C22	TI	* 0.00400+- 0.00050	0.00303+- 0.02382	0.76+- 5.96	0.0
C23	V	* 0.00010< 0.00030	0.00012< 0.02382	1.20< *****	0.0
C24	CR	* 0.00000< 0.00040	0.00008< 0.02382	0.00< 0.00	0.0
C25	MN	* 0.00060+- 0.00060	0.00125+- 0.02381	2.08+-39.74	0.0
C26	FE	* 0.03420+- 0.00200	0.03524+- 0.02398	1.03+- 0.70	0.0
C28	NI	* 0.00140+- 0.00100	0.00000+- 0.02382	0.00+-17.02	-0.1
C29	CU	* 0.00090+- 0.00080	0.00023+- 0.02381	0.26+-26.46	0.0
C30	ZN	* 0.00330+- 0.00080	0.00236+- 0.02384	0.71+- 7.23	0.0
C31	GA	* 0.00000< 0.00050	0.00000< 0.02382	0.00< 0.00	0.0
C32	GE	* 0.00000< 0.00050	0.00000< 0.02382	0.00< 0.00	0.0
C33	AS	* 0.00140+- 0.00050	0.00000+- 0.02382	0.00+-17.02	-0.1
C34	SE	* 0.00010< 0.00040	0.00000< 0.02382	0.00< *****	0.0
C35	BR	* 0.00130+- 0.00040	0.00005+- 0.02381	0.04+-18.31	-0.1
C37	RB	* 0.00050+- 0.00050	0.00005+- 0.02381	0.09+-47.62	0.0
C38	SR	* 0.00080+- 0.00060	0.00002+- 0.02381	0.02+-29.76	0.0
C39	Y	* 0.00180+- 0.00080	0.00000+- 0.02382	0.00+-13.23	-0.1
C40	ZR	* 0.00000< 0.00090	0.00000< 0.02382	0.00< 0.00	0.0

C42	MO	*	0.00000<	0.00140	0.00000<	0.02382	0.00<	0.00	0.0
C46	PD	*	0.00000<	0.00220	0.00002<	0.02381	0.00<	0.00	0.0
C47	AG	*	0.00320+-	0.00240	0.00005+-	0.02381	0.02+-	7.44	-0.1
C48	CD	*	0.00240<	0.00250	0.00005<	0.02381	0.02<	9.92	-0.1
C49	IN	*	0.00000<	0.00270	0.00000<	0.02382	0.00<	0.00	0.0
C50	SN	*	0.01290+-	0.00360	0.00010+-	0.02381	0.01+-	1.85	-0.5
C51	SB	*	0.00630+-	0.00350	0.00000+-	0.02382	0.00+-	3.78	-0.3
C56	BA		0.00270+-	0.00170	0.00049+-	0.02381	0.18+-	8.82	-0.1
C57	LA	*	0.00020<	0.00160	0.00184<	0.02388	9.20<	*****	0.1
C80	HG	*	0.00110+-	0.00110	0.00000+-	0.02382	0.00+-	21.66	0.0
C82	PB	*	0.00000<	0.00120	0.00032<	0.02382	0.00<	0.00	0.0
C200	TC		5.59300+-	0.42900	4.99062+-	0.97484	0.89+-	0.19	-0.6
C201	OC	*	5.29340+-	0.36400	4.02087+-	0.91777	0.76+-	0.18	-1.3
C202	EC	*	0.29810+-	0.11490	0.96974+-	0.32951	3.25+-	1.67	1.9
C203	SO4		0.39950+-	0.02000	0.07153+-	0.03815	0.18+-	0.10	-7.6
C204	NO3	*	0.58680+-	0.02930	0.60739+-	0.03842	1.04+-	0.08	0.4
C205	NH4	*	0.21470+-	0.01070	0.18462+-	0.02958	0.86+-	0.14	-1.0
C217	CL2		0.00000<	0.06240	0.02017<	0.02543	0.00<	0.00	0.3
C219	K2		0.00000<	0.06240	0.10934<	0.09369	0.00<	0.00	1.0
C300	F2		0.09240+-	0.00460	0.00000+-	0.00079	0.00+-	0.01	-19.8
C301	NA2		0.44530+-	0.02220	0.00000+-	0.00079	0.00+-	0.00	-20.0
C302	CA2		0.30050+-	0.01500	0.00000+-	0.00079	0.00+-	0.00	-20.0
C303	MG2		0.03650+-	0.00180	0.00000+-	0.00079	0.00+-	0.02	-18.6
C304	NA	*	0.02710+-	0.01370	0.00441+-	0.00108	0.16+-	0.09	-1.7
C305	CO	*	0.00000<	0.00120	0.00000<	0.00079	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 2/24/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.97	% MASS	98.5
CHI SQUARE	0.33	DEGREES FREEDOM	37

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML11	S04_FZER	0.24955	0.03331	7.49196
YES HAML13	NH4NO3F2	1.49638	0.09596	15.59421
YES HAML55	RWC_ALON	8.49941	1.87971	4.52166

10.24535

MEASURED CONCENTRATION FOR SIZE: FINE
10.4+- 0.0

Eligible Space Collinearity Display

=====
=====
ELIGIBLE SPACE DIM. = 3 FOR MAX. UNC. = 2.08000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.03172 0.09596 1.87974

NUMBER ESTIMABLE SOURCES = 3 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML11 1.0000 HAML13 1.0000 HAML55

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		MEASURED	UNCERTAINTY
			CALCULATED	RESIDUAL		
TMAC	TMAU	10.40000+- 0.00010	10.24535+- 1.87228	0.99+- 0.18	-0.1	
C12	MG	* 0.00000< 0.00520	0.00595< 0.02501	0.00< 0.00	0.2	
C13	AL	* 0.01460+- 0.00480	0.00170+- 0.02497	0.12+- 1.71	-0.5	
C14	SI	* 0.02880+- 0.00320	0.00000+- 0.02497	0.00+- 0.87	-1.1	
C15	P	* 0.00000< 0.00110	0.00000< 0.02497	0.00< 0.00	0.0	
C16	S	* 0.09840+- 0.00640	0.09840+- 0.00841	1.00+- 0.11	0.0	
C17	CL	0.01950+- 0.00240	0.04335+- 0.02509	2.22+- 1.32	0.9	
C19	K	* 0.03280+- 0.00230	0.07309+- 0.02636	2.23+- 0.82	1.5	
C20	CA	* 0.00330+- 0.00130	0.00595+- 0.02497	1.80+- 7.60	0.1	
C22	TI	* 0.00010< 0.00040	0.00000< 0.02497	0.00< ****	0.0	
C23	V	* 0.00110+- 0.00040	0.00000+- 0.02497	0.00+-22.70	0.0	
C24	CR	* 0.00000< 0.00040	0.00000< 0.02497	0.00< 0.00	0.0	
C25	MN	* 0.00110+- 0.00060	0.00000+- 0.02497	0.00+-22.70	0.0	
C26	FE	* 0.00440+- 0.00090	0.00000+- 0.02497	0.00+- 5.67	-0.2	
C28	NI	* 0.00010< 0.00100	0.00000< 0.02497	0.00< ****	0.0	
C29	CU	* 0.00160+- 0.00080	0.00000+- 0.02497	0.00+-15.61	-0.1	
C30	ZN	* 0.00410+- 0.00090	0.00340+- 0.02497	0.83+- 6.09	0.0	
C31	GA	* 0.00090+- 0.00050	0.00000+- 0.02497	0.00+-27.74	0.0	
C32	GE	* 0.00110+- 0.00050	0.00000+- 0.02497	0.00+-22.70	0.0	
C33	AS	* 0.00060+- 0.00050	0.00000+- 0.02497	0.00+-41.62	0.0	
C34	SE	* 0.00060+- 0.00040	0.00000+- 0.02497	0.00+-41.62	0.0	
C35	BR	* 0.00240+- 0.00040	0.00000+- 0.02497	0.00+-10.40	-0.1	
C37	RB	* 0.00030< 0.00050	0.00000< 0.02497	0.00< 83.23	0.0	
C38	SR	* 0.00010< 0.00060	0.00000< 0.02497	0.00< ****	0.0	
C39	Y	* 0.00000< 0.00080	0.00000< 0.02497	0.00< 0.00	0.0	
C40	ZR	* 0.00120+- 0.00100	0.00000+- 0.02497	0.00+-20.81	0.0	
C42	MO	* 0.00000< 0.00150	0.00000< 0.02497	0.00< 0.00	0.0	

C46	PD	*	0.00090<	0.00230	0.00000<	0.02497	0.00<	27.74	0.0
C47	AG	*	0.00400+-	0.00240	0.00000+-	0.02497	0.00+-	6.24	-0.2
C48	CD	*	0.00000<	0.00240	0.00000<	0.02497	0.00<	0.00	0.0
C49	IN	*	0.00250<	0.00280	0.00000<	0.02497	0.00<	9.99	-0.1
C50	SN	*	0.00560+-	0.00340	0.00000+-	0.02497	0.00+-	4.46	-0.2
C51	SB	*	0.00060<	0.00360	0.00000<	0.02497	0.00<	41.62	0.0
C56	BA		0.00130<	0.00170	0.00000<	0.02497	0.00<	19.21	-0.1
C57	LA	*	0.00190+-	0.00150	0.00000+-	0.02497	0.00+-	13.14	-0.1
C80	HG	*	0.00240+-	0.00110	0.00000+-	0.02497	0.00+-	10.40	-0.1
C82	PB	*	0.00280+-	0.00120	0.00000+-	0.02497	0.00+-	8.92	-0.1
C200	TC		6.59450+-	0.47960	0.00000+-	0.02497	0.00+-	0.00	-13.7
C201	OC	*	6.34470+-	0.41670	4.03722+-	1.17318	0.64+-	0.19	-1.9
C202	EC	*	0.25680+-	0.11290	1.08793+-	0.71439	4.24+-	3.35	1.1
C203	SO4		0.40220+-	0.02010	0.02465+-	0.02501	0.06+-	0.06	-11.8
C204	NO3	*	1.10320+-	0.05540	1.15970+-	0.06320	1.05+-	0.08	0.7
C205	NH4	*	0.39590+-	0.01980	0.33669+-	0.04193	0.85+-	0.11	-1.3
C217	CL2		0.07990+-	0.00400	0.00000+-	0.02497	0.00+-	0.31	-3.2
C219	K2		0.00000<	0.06240	0.00000<	0.02497	0.00<	0.00	0.0
C300	F2		0.08740+-	0.00440	0.00000+-	0.00086	0.00+-	0.01	-19.5
C301	NA2		0.42880+-	0.02140	0.00000+-	0.00086	0.00+-	0.00	-20.0
C302	CA2		0.31600+-	0.01580	0.00000+-	0.00086	0.00+-	0.00	-20.0
C303	MG2		0.03770+-	0.00190	0.00000+-	0.00086	0.00+-	0.02	-18.1
C304	NA	*	0.01650+-	0.01370	0.00000+-	0.00086	0.00+-	0.05	-1.2
C305	CO	*	0.00000<	0.00130	0.00000<	0.00086	0.00<	0.00	0.0

Chemical Mass Balance Version EPA-CMB8.2
Report Date: 8/13/2008

SAMPLE: OPTIONS: INPUT FILES:

SITE: HAMIL BRITT & LUECKE: No INHAMIL2.IN8
SAMPLE DATE: 3/1/08 SOURCE ELIMINATION: No SOHAMIL3.SEL
DURATION: 24 BEST FIT: No POHAMIL2.txt
START HOUR: 0 DSHAMIL2.SEL
SIZE: FINE ADHAMIL2.txt
 PRHAMIL3.csv

Species Array: 1
Sources Array: 1

FITTING STATISTICS:

R SQUARE	0.94	% MASS	99.8
CHI SQUARE	0.26	DEGREES FREEDOM	36

SOURCE CONTRIBUTION ESTIMATES:

SOURCE EST CODE	NAME	SCE($\mu\text{g}/\text{m}^3$)	Std Err	Tstat
YES HAML05	RDDST_BT	0.13675	0.06190	2.20928
YES HAML11	S04_FZER	0.22671	0.02796	8.10903
YES HAML13	NH4NO3F2	0.12653	0.03046	4.15455
YES HAML63	RSWDBRN4	2.00597	0.28429	7.05605

2.49597				

MEASURED CONCENTRATION FOR SIZE: FINE

2.5+- 0.0

Eligible Space Collinearity Display

=====

ELIGIBLE SPACE DIM. = 4 FOR MAX. UNC. = 0.50000 (20% OF TOTAL MEAS.
MASS)

1 / Singular Value

0.02787 0.03046 0.06194 0.28429

NUMBER ESTIMABLE SOURCES = 4 FOR MIN. PROJ. = 0.95
 PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE PROJ. SOURCE

1.0000 HAML05 1.0000 HAML11 1.0000 HAML13 1.0000 HAML63

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
 COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE COEFF. SOURCE SCE Std
 Err

SPECIES CONCENTRATIONS:

SPECIES	FIT	MEASURED	CALCULATED		RESIDUAL	UNCERTAINTY
			CALCULATED	MEASURED		
TMAC	TMAU	2.50000+- 0.00010	2.49597+- 0.29268	1.00+- 0.12	0.0	
C12	MG	* 0.00660+- 0.00520	0.00000+- 0.02267	0.00+- 3.44	-0.3	
C13	AL	* 0.01370+- 0.00470	0.01852+- 0.02275	1.35+- 1.72	0.2	
C14	SI	* 0.04830+- 0.00410	0.04794+- 0.02317	0.99+- 0.49	0.0	
C15	P	* 0.00000< 0.00110	0.00056< 0.02267	0.00< 0.00	0.0	
C16	S	* 0.07810+- 0.00550	0.07810+- 0.00748	1.00+- 0.12	0.0	
C17	CL	0.00960+- 0.00220	0.00287+- 0.02267	0.30+- 2.36	-0.3	
C19	K	* 0.01710+- 0.00160	0.00534+- 0.02267	0.31+- 1.33	-0.5	
C20	CA	* 0.00930+- 0.00140	0.00566+- 0.02268	0.61+- 2.44	-0.2	
C22	TI	* 0.00180+- 0.00050	0.00046+- 0.02267	0.26+-12.60	-0.1	
C23	V	* 0.00110+- 0.00040	0.00005+- 0.02267	0.04+-20.61	0.0	
C24	CR	* 0.00010< 0.00040	0.00004< 0.02267	0.41< *****	0.0	
C25	MN	* 0.00040< 0.00060	0.00018< 0.02267	0.45< 56.68	0.0	
C26	FE	* 0.00760+- 0.00100	0.00598+- 0.02268	0.79+- 2.99	-0.1	
C28	NI	* 0.00000< 0.00110	0.00001< 0.02267	0.00< 0.00	0.0	
C29	CU	* 0.00000< 0.00090	0.00045< 0.02267	0.00< 0.00	0.0	
C30	ZN	* 0.00340+- 0.00090	0.00055+- 0.02267	0.16+- 6.67	-0.1	
C31	GA	* 0.00020< 0.00060	0.00000< 0.02267	0.00< *****	0.0	
C32	GE	* 0.00050< 0.00060	0.00000< 0.02267	0.00< 45.34	0.0	
C33	AS	* 0.00170+- 0.00050	0.00003+- 0.02267	0.02+-13.34	-0.1	
C34	SE	* 0.00000< 0.00050	0.00000< 0.02267	0.00< 0.00	0.0	
C35	BR	* 0.00010< 0.00050	0.00002< 0.02267	0.22< *****	0.0	
C37	RB	* 0.00060+- 0.00060	0.00000+- 0.02267	0.00+-37.79	0.0	
C38	SR	* 0.00000< 0.00070	0.00004< 0.02267	0.00< 0.00	0.0	
C39	Y	* 0.00000< 0.00080	0.00000< 0.02267	0.00< 0.00	0.0	
C40	ZR	* 0.00130+- 0.00110	0.00000+- 0.02267	0.00+-17.44	-0.1	

C42	MO	*	0.00000<	0.00160	0.00000<	0.02267	0.00<	0.00	0.0
C46	PD	*	0.00270+-	0.00240	0.00003+-	0.02267	0.01+-	8.40	-0.1
C47	AG	*	0.00000<	0.00240	0.00001<	0.02267	0.00<	0.00	0.0
C48	CD	*	0.00000<	0.00240	0.00003<	0.02267	0.00<	0.00	0.0
C49	IN	*	0.00080<	0.00280	0.00000<	0.02267	0.00<	28.34	0.0
C50	SN	*	0.00110<	0.00350	0.00000<	0.02267	0.00<	20.61	0.0
C51	SB	*	0.00000<	0.00380	0.00015<	0.02267	0.00<	0.00	0.0
C56	BA		0.00170<	0.00180	0.00015<	0.02268	0.09<	13.34	-0.1
C57	LA	*	0.00140<	0.00160	0.00016<	0.02268	0.11<	16.20	-0.1
C80	HG	*	0.00140+-	0.00120	0.00000+-	0.02267	0.00+-	16.19	-0.1
C82	PB	*	0.00160+-	0.00130	0.00025+-	0.02267	0.16+-	14.17	-0.1
C200	TC		1.59800+-	0.22970	1.63446+-	0.10704	1.02+-	0.16	0.1
C201	OC	*	1.54310+-	0.17680	1.32419+-	0.10540	0.86+-	0.12	-1.1
C202	EC	*	0.05640<	0.10290	0.31027<	0.02938	5.50<	10.05	2.4
C203	SO4		0.34830+-	0.01740	0.00282+-	0.02268	0.01+-	0.07	-12.1
C204	NO3	*	0.09990+-	0.00500	0.09877+-	0.02320	0.99+-	0.24	0.0
C205	NH4	*	0.00000<	0.06240	0.03047<	0.02285	0.00<	0.00	0.5
C217	CL2		0.00000<	0.06240	0.00003<	0.02267	0.00<	0.00	0.0
C219	K2		0.00000<	0.06240	0.00155<	0.02267	0.00<	0.00	0.0
C300	F2		0.06620+-	0.00330	0.00000+-	0.00020	0.00+-	0.00	-20.0
C301	NA2		0.43700+-	0.02180	0.00000+-	0.00020	0.00+-	0.00	-20.0
C302	CA2		0.22930+-	0.01150	0.00000+-	0.00020	0.00+-	0.00	-19.9
C303	MG2		0.02970+-	0.00150	0.00000+-	0.00020	0.00+-	0.01	-19.6
C304	NA	*	0.01820+-	0.01280	0.00000+-	0.00020	0.00+-	0.01	-1.4
C305	CO	*	0.00000<	0.00130	0.00000<	0.00003	0.00<	0.00	0.0
